The Builder.

VOL. LXVI. No. 2665. MARCH 3, 1894.

ILLUSTRATIONS.

The Ancient Cathedrals of Scotland.—X.—Elgin.—Drawn by Mr. Alexander McGibbon ..... *Double-Page Ink-Photo.*
Plan of Elgin Cathedral ..... *Double-Page Photo-Litho*
Vendramini Palace, Venice.—Illustrating Professor Aitchison's Royal Academy Lectures ..... *Double-Page Ink-Photo.*
Some Renaissance Palaces.—Illustrating Professor Aitchison's Royal Academy Lectures ..... *Double-Page Ink-Photo.*

Blocks in Text.

East Gable, South Corner, Elgin Cathedral ..... Page 175
Entrance to Chapter House, Elgin Cathedral ..... „ 176
The West Doorway Elgin Cathedral ..... „ 177
Diagram of Soil Pipe ..... Page 18
South Transept Door, Elgin Cathedral ..... Page 178
Diagram, Dedreux Iron-Framing for Concrete Partitions ..... „ 184
Diagram, the "Eagle" Chimney Top ..... „ 184

CONTENTS.

Philæ and the Reservoir 165
Notes 166
Letter from Paris 168
The Advancement of Architecture 169
Royal Institute of British Architects 172
Elgin Cathedral 175
Vendramini Palace 178
Some Renaissance Palaces 179
The London County Council 179
Builders' Clerks' Benevolent Institution 180
Architectural Societies 180
Archæological Societies 180
Institution of Civil Engineers 180
Beveridge Hall Competition, Kirkcaldy 181
Orientation in Architecture 181
Surrey County Council Surveyorship 181
North Wales Asylum Competition 182
"Blind-Story" 182
Hereford Cathedral 182
Obituary 183
Student's Column: The Structure and Physical Properties of Building Stones.—IX. 182
General Building News 183
Sanitary and Engineering News 183
Foreign and Colonial 184
Miscellaneous 184
Meetings 185
Recent Patents 186
Some Recent Sales of Property 186
Prices Current of Materials 187

Philæ and the Reservoir.

A PROPOSAL to form a large reservoir in Egypt by damming up the flood water of the Nile, and thereby securing a plentiful supply of irrigation water all the year round, is in itself a matter of sufficient importance both in an engineering and in an economic point of view to be well worth the attention of the public generally as well as of engineers. It is doubtful, however, whether it would have attracted any great share of public attention in this country had it not been for the fact that the scheme most favoured by the engineers and others who are promoting it involves the destruction of one of the most widely-known and admired relics of ancient architecture, and one of the most picturesque places in the world. There is a sort of fascination about the very name of Philæ; it has a kind of sacred sound in the ears of all artists and lovers of art. Such is the disproportion between material and mental interests, that the scale of the engineering operations proposed, and the economic benefits to be obtained from it, appear to a large portion of the world matters of secondary interest compared with the fact that the destruction of Philæ is to be the price of these practical gains. Of course, allowance must be made for the difference of personal interest in the matter. The inhabitants of countries or cities which are famed for the beauty or interest of their architectural remains mostly care little for these. They have lived among the ruins always, and regard them as common and every-day facts, to be looked at only in the light of their own interests. The Venetian Municipality, it has been long understood, would be quite willing, even desirous, to fill up all the smaller canals and turn them into streets for wheeled traffic, if they could raise the funds to do it, in order to render mercantile traffic easier and increase the commercial prosperity of the city. Venice, as we regard it, is nothing to them; it is the place where they live and do their daily business; and they imagine, rightly or wrongly, that waterways are not convenient in this light. Similarly, it may be presumed, the Egyptians do not care much about Philæ, and would be very ready to sacrifice it for better means of irrigation and a larger annual revenue. On the other hand, the irrigation and the revenue do not very directly affect us; we are only conscious that we are threatened with the loss of something beautiful and of historic interest, which many of us have seen and others wish to see. There is a certain amount of selfishness, on each side, to be allowed for. Before reckoning up the account, and estimating the relative value of the claims of the æsthetic and the engineering party, let us consider what are the actual proposals and alternatives offered by the latter.

The Cairo correspondent of the *Times*, in its issue of the 24th instant, furnishes a description of the main proposals of the undertaking which have lately been investigated by the engineers of the Egyptian Government, having for its principal aim the irrigation of Upper, Middle, and Lower Egypt by means of a gigantic reservoir to be formed by the construction of a high dam across the Nile itself. After four years of study devoted to the subject, the results of which have been embodied in a volumnious report by the Inspector-General of Reservoirs, four different sites have been proposed for the dam between Cairo and Wady-Halfa. There is also a fifth scheme, one that has been for some years strenuously advocated by Mr. Cope Whitehouse, an American gentleman, for converting a huge natural depression which exists in the Fayoum into an enormous lake, having an area of 670 square kilomètres, or, roughly, 270 square miles. As that scheme would only serve Lower Egypt, and, at the same time, be more costly than either of the other four, it is not recommended for consideration.

The four alternative sites for the great dam are situated respectively at—1st, Kalabsha, 31 miles above Assouan; 2nd, the south end of the Island of Philæ; 3rd, Assouan itself; and 4th, Silsila, 44 miles lower down the river.

After stating the advantages and drawbacks of each of the four sites, Mr. Wilcocks, the Inspector-General of Reservoirs, gives the preference to that of Assouan; for reasons which, from an engineering point of view alone, appear to be irresistible, and justify the title of "a perfect site for the construction of a dam;" the conditions being that the bed of the river consists of homogeneous rock of a hard description, while during its low stage the river is split up into several channels, thereby offering great facilities for the diversion of the water during the process of laying the foundation. At the other sites the quality of the rock is said not to be uniform. The site at Assouan has, however, the one drawback (already mentioned), that it would submerge the well-known monuments at Philæ. This may appear to engineers to be a sentimental objection, trivial in comparison with the great national benefit which would be conferred by the construction of the reservoir at this spot. It is, however, hardly to be so dismissed, but we will return to this point further on.

The idea of throwing dams across the Nile for both irrigation and navigation purposes is not new, but has occupied the attention of several engineers in the past. The objections which have been urged by opponents of any dam being raised on the Nile are so trivial as to be scarcely deserving of notice, but they have been courteously and at the same time conclusively answered. Undoubtedly the works proposed are great, but they do not exceed either in difficulty or magnitude similar structures which have been successfully built, and are at the present moment in operation in India. The great dam, a mile in length across the River Godavery at the site of the first barrier, or cataract, as it would be called in Egypt, is one almost exactly similar. The masonry dam, 100 ft. high, forming the great lake near Poona, and a similar in the South of India across the River Perryaur, are both much higher than those proposed for the Nile. The first-named has to bear a much more serious overfall, and to discharge a far greater volume than the Nile carries, so that there is no special engineering difficulty to be overcome at any of the four sites on the Nile, which has not been already encountered in the Indian works. But the estimated cost is very much greater. In the absence of plans, and with only such a summary of information as the *Times* correspondent can give, it is not possible to form more than a very general idea of the engineering features of the scheme, and of the conditions which govern its dimensions, especially that of the dam, viz., 22 mètres, or

about 72 feet. It cannot be gathered whether this is the extreme height of the dam at any one part, or its average height throughout its entire length. Of course, the whole question as to the trial it has to sustain during the period of floods depends on the proportion of the river's waterway obstructed by it—unless, indeed, it is intended to serve merely as a retaining dam and not as a weir, and to provide for the whole volume in flood being discharged through the 100 or 120 openings, whose aggregate waterway area is stated to be 2,000 or 2,400 square mètres, capable, it is calculated, to pass 10,000 cubic mètres per second, with a mean velocity of 5 mètres per second, and a head of 2 mètres, or 6½ ft., equivalent in round numbers to a volume of 47 million cubic yds. per hour. But as that discharge is little more than one-fourth of the volume in a high flood of the Ganges and other rivers in India, to which a maximum flood of the Nile probably approaches, the above openings would be insufficient for the discharge of the entire volume in a maximum flood, and, if so, the greater portion would have to flow over the dam itself. Possibly the "head" of 2 mètres which is to give the velocity through the sluices represents the depth which it is intended to pass over the dam. This, of course, can only be conjectural, and it is alluded to here only with reference to the strain mentioned above to which, if the dam has to serve as a weir, it will be subjected.

Although the other dimensions are specified, the width of the river and consequent length of the dam is not mentioned, and as nothing is said as to the contents of the reservoir, a rough approximation only can be arrived at as to its capacity from the statement that the dam, if located at Assouan, would hold the water back as far as Korosko, a distance apparently of about 125 miles. If this be correct, the contents when the reservoir is full would probably exceed 1,000 million cubic yards.

But the question arises whether it would not be possible, and, if possible, expedient also, in the interests of navigation, to seek for a site so much higher up the river as would get over the difficulty of passing the Third Cataract, and adapting the main canal from thence to steamer navigation and carrying it past the two lower cataracts, as well as the shoals which may be met with in the low water season.

The dimensions of the main canal to carry the requisite volume for irrigating the immense tract to which it is in contemplation to lead it, must necessarily be very considerable, and so it could be easily adapted for navigation purposes as well.

As the principal object of the scheme is to secure the storage of a portion of the Nile which now flows unutilised to the sea, it is essential to construct a dam of much greater height than would be necessary were the passage of the several cataracts alone to be considered, and therefore where the dam forms so large a portion of the expense (it is estimated at 1¾ millions sterling nearly) it may be worthy of consideration whether it would not be advisable to secure the double object of overcoming the difficulties encountered at the cataracts, and providing for the irrigation of the country, by one and the same work, and whether it would not be less expensive to construct a greater length of canal than to multiply the number of weirs with all their attendant works for the passage of the different rapids, as has already been elsewhere mooted. If this alternative be practicable all the objections urged in regard to interference with ancient monuments will be removed, and a still more extended benefit be conferred upon Egypt by the attainment of results similar to those which have been experienced on the frontier of India, where turbulent tribes have been induced to lay aside the sword and forsake their lawless proclivities, and become the peaceful cultivators of tracts which had hitherto lain unproductive solely on account of the insecurity engendered by the marauding tribes to which they were adjacent.

The grand financial returns which are represented as certain to accrue from the proposals now under consideration would be still further greatly enhanced if the savage tribes in and around the Soudan have the opportunity afforded them of migrating to Egypt and becoming cultivators of the soil, and thus giving that kingdom a secure and peaceful frontier, instead of the continually disturbed conditions which now exist.

Coming now to the question of the claims of Philæ, we may observe in the first place that it is an alarming instance of the manner in which engineering interests are now supposed to override every æsthetic consideration, that a proposal to submerge this island and its remains in a reservoir should be made by engineers in as calm and matter-of-fact a manner as if it were a kind of everyday occurrence. It is true that Mr. Garstin's report on the matter, part of which was read at the meeting of the Society for the Preservation of the Monuments of Ancient Egypt on February 23, was reasonable and moderate in its views; but he is very exceptional among engineers in this respect, and when we are told that it was so admirable on his part to confine himself entirely to the engineering aspect of the matter, we may reply that engineers would command more respect from some people if they showed a little more enlightened interest in ancient works, and a less marked tendency to look at everything in the world from the point of view of their own work only. But the fact seems to be that the majority of engineers are absolutely unable to understand the interest which people of rather wider education and sympathies attach to monuments of architectural beauty and archæological value. We remember once looking, in company with an engineer, at one of the most beautiful bits of Early English architecture in this country, when our companion inquired, "what it was that we admired in it." We did not attempt to explain, as it would have been obviously useless; but we thought the question very characteristic. The same entire ignorance of the architectural bearing of the subject is shown in the absurd proposition that has been made to spend over 200,000*l.* in taking down the Philæ buildings and erecting them on another island! What do they suppose would be the value of the buildings to architects or archæologists after that process? As has already been observed elsewhere, they might just as well throw the money into the Nile. And to crown all, "A Civil Engineer" writes to the *Times* to intimate that the island and the temples would be greatly improved by being sunk under water for three-quarters of the year, and that we should be able to study and examine the remains on it with much greater pleasure and satisfaction when the débris had been carried away and "the island would appear clothed with verdure and far more beautiful than it is to-day." Is this intended as a joke? If not, it is certainly a most characteristic specimen of the attitude of the engineering mind.

At the meeting of the "Society for the Preservation of the Monuments of Ancient Egypt," already referred to, the following resolution was put:—

"That the Society for the Preservation of the Monuments of Ancient Egypt have heard with dismay that the project of making a dam above Assouan to form a reservoir of the Nile water, which will entail the submersion of the Island and Temples of Philæ during many months in every year, is about to be considered as one of the schemes which may be recommended for adoption by the Technical Commission recently appointed in Cairo to consider the question.

The destruction of this group of buildings, unique for its beauty and of the highest historical interest, is an event which would be viewed as a disaster by the whole civilised world; and the proposed taking down and reconstruction of the temples on another island, will in no way meet the objections to the scheme.

The Society therefore begs to submit to the Secretary of State for Foreign Affairs that immediate steps should be taken to press for the withdrawal of the project from the consideration of the Technical Commission, and thus prevent this country being in any way responsible for what would certainly be considered an act of vandalism."

Mr. Statham moved the addition of the following words at the close of the last paragraph but one of the resolution:—

"The buildings will probably be injured in the course of removal, and their historical value will be hopelessly impaired."

With this addition (the last two words of which are perhaps hardly strong enough), the resolution was put to the meeting, and carried unanimously except for the contrary vote of Colonel Scott Moncrieff, Mr. Garstin's predecessor in Egypt, who when in that country was regarded as a very faithful and helpful ally of the Society, but who caused some amusement by now unexpectedly appearing as a kind of Balaam, prophesying the reverse way to what was expected from him.

The reason for Colonel Scott Moncrieff's hostile vote was, we understand, that he thought "everything should be threshed out," and this was a resolution for preventing the threshing out, and for taking the scheme which would destroy Philæ out of the catagory of alternatives for consideration. There is some reason in this; and Lord Carlisle, who was in the chair, frankly admitted that if there were no other possible way of providing the reservoir, Philæ could not be allowed to stand in the way of a great public improvement. Of this there can be no question. The question is, whether it is justifiable to sacrifice Philæ merely because the Assouan position for the proposed dam is the best and most economical from an engineering point of view; and whether something ought not to be sacrificed by forming the reservoir in a less advantageous position, for the sake of saving Philæ. If this could be discussed by a committee representing engineering and architectural and historical interests alike, we should be ready to abide by the conclusion of such a committee. But the matter appears to be at present left to the consideration of three eminent engineers, and we fear that eminent engineers will recognise only one side of the question. The "Civil Engineer" who writes to the *Times* admits frankly that "Philæ is the most beautiful spot in Egypt; it seems more like the creation of a painter's fancy than an actual scene;" but this does not the least prevent him from treating with indifference the proposal to submerge it. Sir Benjamin Baker, who represents this country on the Engineering Commission now engaged in reporting on the subject, is a great engineer, of whose fame and genius as such we are all proud; but the fact that he has lent himself to the erection of the monstrosity in progress at Wembley Park does not say very much for the acuteness of his æsthetic sensibilities, and that is why we are inclined to support the view that the Philæ scheme should be taken out of the category of alternatives. The engineers are not to be trusted with it; they see only one side of the question. Many of them, we fear, would calmly submerge all the temples in Egypt for the sake of a better irrigation scheme; and when we hear of all the advantages offered by the submergence of Philæ, we are inclined to doubt whether this is only the thin end of the wedge, and to say, *Timeo Danaos et dona ferentes.*

NOTES.

THE attitude of the County Council in regard to the London water supply question, as defined at their last meeting, is so far in the right direction. The Council has refused to regard the position in which the matter has been left by the Royal Commission as a satisfactory or final one, more especially in regard to the really absurd suggestion of the Commission that we should be content with providing for London for only forty years from the present moment. That is a very short time in the history of such a city as London; and if that position be adopted the next

generation will find the whole question with its difficulties and anxieties pressing upon them afresh. The mischief which has been done by the one-sided and narrow Report of the Royal Commission is already beginning practically to show itself. The water companies are applying for increased powers, and, as Mr. Bassett Hopkins observed in moving the adoption of the water committee's recommendations, the water companies had drawn the conclusion that because it was physically possible, according to the Royal Commission, to get a sufficient supply for forty years to come within the Thames basin, it ought to be done, a conclusion which by no means follows from the premisses. According to this theory, the water companies are to go on drawing a constantly-increasing amount of water out of the Thames, which it is calculated will supply us for the next forty years, at the end of which time we shall probably be forced to look to some outside supply, while in the meantime the river will have been hopelessly spoiled as a river, and we shall have been all the while either drinking water imperfectly purified, or spending immense extra sums to ensure purification, which, when the river has at length to be abandoned as no longer sufficient, will have been all money thrown away, while we shall have been left all that time in the hands of trading companies for our water supply. Such a theory of the treatment of the subject is preposterous. The County Council has, in this matter at least, taken the first step in the right direction; and, though it will be a long business, we hope the ultimate result will be to provide London, at no very distant future, with an ample supply of water out of the public rates, instead of having it doled out by companies making huge profits out of it.

THE undesirable proposal to tack on a monumental chapel to Westminster Abbey, on the plan originally suggested by the architectural genius of Mr. Shaw-Lefevre, has been revived again by the offer of Mr. Yates Thompson to contribute the cost of erecting a portion of the building. It is to be hoped that this offer will be declined. Such an addition, in the manner proposed, would in reality be no part of the Abbey, and would therefore have no sentimental value attaching to it as a historic place of monuments, while it would afford a plausible excuse for dignifying with the supposed honour of burial in Westminster Abbey a number of people whom their friends alone would think worthy of such a distinction, and who now are kept out from "snug lying in the Abbey" by the fact that there is no room to celebrate there any but the few persons in a century who can really claim the epithet of "great." If the new chapel were built, there will be a kind of rush of "eminent men" to die and be buried in it, under the delusive idea that they are securing burial in the Abbey, instead of in what would probably be called "the Yates Thompson wing" (just as we say "the White wing" at the British Museum), since the proposing donor, with very questionable taste, has made it a condition that his name should be legibly inscribed somewhere near the main entrance. If we are eventually to have any national monument house built, it had better be made a separate thing, away from all pretence of being part of the Abbey, and built at the cost of the nation, not of donors who want their names inscribed on it.

WE have received the Annual Report of the Cremation Society of England; which does not, however, chronicle any marked steps or progress in the movement during the year. The annual number of cremations at Woking has, it appears, slightly fallen, 101 bodies having been cremated during 1893 as against 104 in 1892. The Report endeavours to account for this by the fact that Manchester has now a very efficient crematorium, but one can hardly think that would affect the numbers at Woking.

AN important work, devoted entirely to the discussion of the metopes of Greek sculpture, has appeared in Russian; it issues, as so much does that is valuable for archæology, from Dorpat. The editors of the *Berliner Philologische Wöchenschrift* have done a real service to students of Greek art by inducing the author (W. Malmberg) to give in a recent issue (1893, No. 25) a full summary in German of the contents of his book. He begins with the metopes of Assos and Selinus, and ends with those of new Ilium. A further chapter is devoted to the metopes of temples only known to us from literary records. The portion devoted to the metopes of the Parthenon deserves special attention. Dr. Malmberg discusses not only the familiar well-preserved centaur metopes, but also all those which in their effaced condition are generally passed over with the expression of a hasty regret. He attributes the metopes of the east and west frieze to an artist of the first rank, whereas the remaining metopes were filled, as he thinks, by subordinate artists from designs furnished to them. In discussing the "Theseion," though he holds with Dr. Dörpfeld that the temple is later in date than the Parthenon, he does not concede the attribution to Hephaistos, but believe it to be the temple of Apollo Patroös. These are only scattered instances of much that is valuable, and now, through this *résumé*, fairly accessible.

THE fourth volume of the Glasgow Architectural Association Sketchbook contains a good many interesting illustrations, the most important being a series of measured drawings of the "Lower Church" at Glasgow Cathedral, by Mr. G. S. Hill. A drawback is the bad way in which they are produced in the lithograph, the elevations more particularly; many of the lines are what lithographers call "rotten," and in other cases they have run into each other and produced only a black mass where there should have been a series of lines indicating the arch-mouldings. It is difficult to say how far this is the fault of the lithographer and how far of the draughtsman; our impression is that the drawings have been reduced more than they will bear; *i.e.*, that they have been too large for the book in the first instance. But there seems to be some fault in the lithographing, for we observe in Mr. Tait Connor's West Doorway of Elgin Cathedral, which is not on such a small scale, the same unsatisfactory appearance. The larger scale drawings are better produced. Mr. W. Cowie gives a careful measured drawing of the lantern of St. Giles's, Edinburgh. Mr. Gillespie gives a measured elevation of the late Mr. Thompson's Greek church in Caledonia-road, Glasgow, again an unsatisfactory lithograph—see the columns and pediment cornice. This is a fine building, the merit of which may be appreciated as much now as when it was built; we fear the same cannot be said for the tower of St. Vincent, U.P. church, by the same architect, of which Mr. L. D. Penman gives measured drawings; one rather wonders now how such detail was ever admired. Mr. John Stewart's sheet of free-hand sketches of "Old Scottish Work," including a most interesting old tomb in Greyfriars Churchyard, Edinburgh, is one of the best pages in the book. Mr. F. M. Miller gives drawings and detail of a fine old cabinet in the Industrial Museum at Edinburgh. Mr. Muirhead's sheet of measured drawings of Jedburgh Abbey is very well done, and his method of showing sections of mouldings by a fine line is far preferable to the method adopted by many draughtsmen of running a *thick* line of black along the inside of the moulding, which looks bad on the page and often confuses the eye as to the real line of the moulding. Most of the mouldings in the book are drawn in this rather objectionable fashion. If it is preferred to shade the inside of the moulding, a clean thin outline and a neat hatching inside it is the best way. The Montgomery Monument at Largs (Late Renaissance), sketched by Mr. Muirhead, looks such a fine thing that it deserved a more careful drawing. Mr. W. J. Anderson gives a good pencil sketch of St. Mary's, Oxford, and Mr. A. Mackintosh a still better one of the east end of St. Paul's, which is perhaps the best thing in the volume. It would be an improvement to number the plates in the margin and in the index.

THE first of a course of six lectures on matters relating to building, arranged for by the Carpenters' Company, was given in the Carpenters' Hall, London Wall, on the 21st ult., by Professor Unwin, F.R.S. The subject of the lecture was "Niagara and the Works for its Utilisation," and a series of lantern views of the Falls and of the works carried out for utilising the water for motor purposes was shown by the lecturer, who, in the course of an interesting address, referred to "the great waste of force" at Niagara, in a manner which reminded us of Edison's similar lament at the wasted force typified in the waves of the ocean—regrets which are seemingly the outcome of scientific methods of thought, and which do not appear to leave much room for the proper appreciation of some of Nature's works. It appears that as early as the year 1725 water-mills were erected at Niagara, but as they spoilt the appearance of the Falls they were subsequently removed; moreover, about eight years ago, both the Canadian and New York State Governments, becoming ashamed of the disfigurement of the Falls, partly by mills and partly by the advertisements of enterprising tradesmen, purchased a quantity of land on both sides of the river as a State reservation, on which no more works were to be erected. In 1853 a more important work—a hydraulic canal—was constructed, by means of which about 6,000 horse-power have been utilised for the last quarter of a century; but the works which have been constructed within the last three years, and which are now practically finished, are of a much larger character. They were described in detail by Professor Unwin, who showed some interesting views of the immense hydraulic tunnel which has been built, and which has a capacity of 120,000 horse-power. The first enterprise to take advantage of the works was the Niagara Paper-Mill, the largest paper-mill in the world, but other contracts have been entered into. To complete the work, all that remains to do is to finish the general power-house, where 5,000 horse-power turbines will operate 5,000 horse-power electric generators. The lecture was well attended, being, like those which are to follow, free to the public.

THE second of the Carpenters' Hall lectures was given on Wednesday by Professor Corfield, whose subject was "House Sanitation." The lecturer did not cover the whole ground of house sanitation, the subject of ventilation, heating and warming being excluded from the lecture; it was limited, therefore, to a consideration of house sanitation in relation to water supply and drainage arrangements. Professor Corfield has the merit of dealing with technicalities in an extremely clear and interesting manner, and in the course of his lecture he spoke of the various and best kinds of water-cisterns, supply-pipes, sinks, traps, water-closets, soil-pipes, and drains, and described a number of diagrams of water-closets, &c. In his remarks about supply-pipes the lecturer mentioned a fact which is not generally known, we believe viz., that if small iron pipes are coated with Angus Smith's solution as soon as made, and before they are stacked, the solution will adhere. A diagram of the first water-closet patented in this or any other country was shown, and, as the lecturer pointed out, what is known as the valve-closet is really a modification of

it. The patent was taken out in the year 1775 by Alexander Cumming. The pan closet, of course, was only mentioned to be condemned, as it has been by the County Council by-laws; and, in the opinion of the Professor, the best form of a simple water-closet basin yet contrived is the short Hopper. In addition to the diagrams, water-closet and other apparatus was described by the lecturer.

MRS. PHILIP NEWMAN read an interesting paper on Tuesday last on Goldsmiths' work, past and present, before the Indian Section of the Society of Arts, which was one of the first that had been delivered before the Society by a lady. Mrs. Newman dealt more particularly with the technical side of goldsmiths' work—a subject of which she has during the last twenty-five years made a special study, having previously modelled and designed for work of this class. Having touched upon the antiquity of her subject, and the literary history of the art, Mrs. Newman, in quoting from an old author that "Gold is very ductile, a spreading and oily metal," described how gold can be hammered, drawn as wire, and fashioned without heat, and is practically ductile enough for these operations without the aid of steam-power, many of the oldest specimens having been worked cold by sheer force. Mrs. Newman referred to the working of pure gold as almost an impossibility, and in discussing the alloys, stated that Purity being represented by twenty-four, standard gold has twenty-two parts pure and two of alloy; eighteen carat gold, eighteen parts pure to six parts of alloy; French gold has a reddish tinge, derived from its alloy of copper. Gold being alloyed to 22·18·15·12 or nine carat, it is melted in a furnace, and having been poured into a mould, is ready for flatting, which is done by rolling it between two heavy steel rollers to the thickness required for the work. Mrs. Newman's description of gold-beating process may be quoted:—

"The gold is cast into oblong ingots, about $\frac{3}{4}$ of an inch thick and wide, and weighs about 2 oz.; this is flattened into a ribbon about $\frac{1}{200}$th part of an inch thick, then annealed or softened by heat, and cut into pieces about an inch square; 150 of these are put between vellum, each piece of gold in the centre of a square of vellum; another and another added, until a pile of 150 is made. This pile is enclosed in a double parchment case, and beaten with a 16 lb. hammer; the elasticity of the packet lightens the labour, as the hammer rebounds with each blow. The beating is repeated, until the inch pieces are spread out to 4-in. squares; they are then taken out, cut into four pieces each, placed this time between gold beaters' skin, and hammered as before, but this time with a lighter hammer; they are again quartered, and again hammered, thus producing 2,400 leaves, having an area of nearly 200 times that of the ribbon, and a thickness of $\frac{1}{200000}$ of an inch."

Some time elapsed after the discovery of the Etruscan gold-work before it was found possible to copy the colour, but it is now obtained by a proper proportion of common salt, saltpetre, and alum, heated with distilled water to 212 Fahr., with the help of scratch-brushing. This treatment gives 18-carat gold the fine bloom of the best Etruscan work. Mrs. Newman very rightly lamented the difference between antique and modern work, and remarked that the processes differed little, but that the lack of an intuitive feeling for art made the gulf between the past and present work of the goldsmith. The subdivision of work of the present day only robs the work of all its interest, and produces workmen who cannot make the article complete, but merely parts. Mrs. Newman briefly traced the history of the goldsmiths' art through early Christian and Roman times to the times of the Renaissance, and referred to the treatise on the craft written in the eleventh century by the monk Theophilus, which evinces a practical knowledge hard to excel even now. At the conclusion of the paper a series of lantern slides illustrating goldsmiths' work were shown, and the usual discussion followed.

IN a "Note" of October 3, 1891, we adverted to the demolition of the Hall, Clement's Inn, and to the leaden figure of the negro supporting a sun-dial, which the Earl of Clare gave to the Society, and Mr. W. Holmes bought for twenty guineas and presented to the Society of the Inner Temple. Some other relics of the Inn were sold by auction at Willis's Rooms a few days ago; being described as a set of portraits, by unknown painters, of celebrated judges and members of Clement's Inn, comprising Sir Edward Coke, Sir Mathew Hale, and Lords Coventry, Thurlow, and Mansfield, together with a silver-headed mace (eighteen guineas) given by the members, in 1794, to J. Blackwell. The block that now covers the hall site was built by Mr. E. C. Bull, from Mr. C. A. Monday's designs and plans; the chambers in course of erection on the garden site are being built by Mr. Bull, atter, as we are informed, Mr. Monday's designs, and under the superintendence of Mr. George Sherrin, architect. The new red brick buildings at Hare-court, Temple, are being constructed after Mr. T. G. Jackson's plans and designs; the contractors are Messrs. J. S. Shillitoe & Son. They will abut, in Middle Temple-lane, against the quaint block of houses, covered with rough-cast, which extend northwards to Wren's gateway, and are, we believe, the oldest remaining sets of chambers in the Temple. Messrs. Abram & Sons, printers and law stationers, of Middle Temple-gate, a long-established firm, recently sent to the *Times* highly interesting particulars to show that some principal works by the greatest English authors of the seventeenth and eighteenth centuries were published at Middle Temple-gate. Ashmole had chambers in the lane; Sir Amyas Paulet built the former gateway, under fine, Aubrey tells us, by Wolsey.

TO find that Mr. Fulleylove has been making a series of sketches in Paris must be a matter of interest to all who are acquainted with his water-colour drawings of architectural subjects. It may, however, perhaps be said that Mr. Fulleylove is not seen quite at his best in the collection of drawings exhibited at the Fine Art Society's gallery under the title of "Paris To-day," for the reason that his style of work is better suited to drawings on a larger scale than the majority of these. Many of them are on a smaller scale than this artist usually works; and his style seems to require more space for broader surfaces of tone and colour; the small drawings here are somewhat heavy and wanting in light. Nor in architecture is he so good with Gothic work like Notre Dame, and with picturesque narrow streets, as with the broad surfaces and open surroundings of Renaissance buildings and gardens. The best drawings in the collection are mostly the larger ones or those that deal with Classical Paris. "Versailles" (52), a garden scene in which the characters of the period of the palace are introduced, with part of a sculptured fountain in the foreground and a fine mass of trees on the right, is admirable; so is "Garden of the King, Versailles (53), and "Termes in the Garden" (50). Among the smaller drawings some are charming in effect however; notably the "Allée des Orangers, Tuileries Gardens" (31), which is full of sunlight; the "Luxembourg Avenue" (37) with Carpeaux' fountain in the foreground; the "Arc de Triomphe du Carrousel, from the Louvre" (57), "St. Etienne du Mont and the Pantheon" (62) seen from the north side of the church; the scene in the Tuileries Gardens (69); "The Pantheon" (73) seen in a glimpse down a narrow crooked street. In "The Tuileries Gardens looking towards the Arc de l'Étoile" (21), the distant arch is put in too strongly and positively, and does not convey the idea of its scale and distance. In general, however, the well-known scenes are represented with remarkable truthfulness. We should not omit mention of a powerful and unusual little study of "Notre Dame" in a rainstorm (55), the only representation of the cathedral that we cared for. We are inclined to think Mr. Fullylove should stick to Classic architecture; he has a special genius for that, but apparently not for Gothic.

LETTER FROM PARIS.

THE exhibition of "Femmes Peintres et Sculpteurs" opened a few days ago; an exhibition at least as much "mondaine" as artistic, and in the latter sense of hopeless mediocrity. Mdme. Léon Bertaux, the really able artist who presides over the Society, shines the more through the absence of any kind of rival, and contributes the only works that are worth looking at. It can hardly be believed that most of the artists exhibiting here would be any the better for securing that education at the "École des Beaux-Arts" which they so persistently demand; their best chance would be to enter the School of Industrial Art, ably presided over by M. Paul Colin at the "École des Arts Décoratifs."

The neighbouring exhibition of the club "l'Epatant" (the old "Mirlitons") draws a crowd of visitors; and among the mass of amateur work of no great value we find some interesting pictures signed by well-known names. Portraits predominate; and among these a portrait of M. Gerôme, by his son-in-law M. Aimé Morot, is a good likeness and a fine picture. MM. Jules Lefebvre and Francois Flameng send some good portraits of ladies, and M. Detaille, in a battle picture, shows his usual ability in realistic detail for which one can partly pardon his hard execution. M. Gervex, following the Napoleonistic craze, has painted a kind of Napoléon of the Opéra Comique declaring his passion to Josephine de Beauharnais. Of two pictures by M. Carolus Duran his "Joueur de Mandoline" is certainly the best. The same artist exhibits two landscapes, the style of which recalls those of Curzon and Ciceri. The well-known boon companion of M. Roybet is here again, as rubicund and commonplace as ever, suggesting a kind of vulgarised Franz Hals. M. Bouguereau's work, "L'Amour Piqué," is as charming and conventional as usual in its pink and pearl flesh tints; quite destitute of real life, but very attractive for all that to the general run of spectators. Of sculpture there is not much to speak of.

At the exhibition of the "Aquarellistes" we get rid of the amateur element, and meet with real and in some cases great artists. Among these may be specially mentioned the "Sentier des Loups" and "Île aux Loups" of M. Bonny; the "Chênes Verts à Pascarella" and the view of "Ponte Salario" by M. Français, which are so full of power and freshness that no one would take them for the work of an octogenarian painter. The contributions of M. Couvent, M. Yon, and M. Zuber are also very fine; and M. Detaille as a water-colourist is a very superior artist to M. Detaille at the "l'Epatant" club; his "Reconnaissance sous Bois" and his "Chasseur à Cheval" are full of energy and fine colour. M. Besnard has brought some picturesque sketches from Algeria; M. Rochegrosse, as usual, is original and violent to the point of eccentricity. M. Lhermitte sends some fine charcoal studies. One of these, the "Halle aux Légumes," constitutes the study for a large picture intended for the Hôtel de Ville.

As already mentioned, the Champ de Mars Salon will this year open in advance of its older rival. There has been again some talk of a union between the two Salons, on the occasion of the Vienna Exhibition, where a sole delegate, chosen by the Directeur des Beaux-Arts, could represent both the societies. But the conciliatory intentions of the Administration have been of no avail, and the rival Salons have decided to exhibit separately at Vienna, and to be represented there respectively by M. Bonnat and M. Carolus Duran. It is difficult to know how these rivalries are to be accommodated when the present buildings or their sites are required for the 1900 Exhibition. Are we to build two new Galleries for the two societies to keep up their rivalry in?

At the Louvre we find, in the Oriental Section, various new possessions of genuine artistic interest, among others a large bronze patera of Chinese workmanship, some Japanese engravings, and a fine writing-box of lacquer and gold with a most elaborately-decorated cover. In the section of ivories we may mention also the acquisition of a splendid Byzantine triptych. The Luxembourg has also some new possessions in the shape of a fine picture by M. Edelfelt, "Journée de Décembre en Finlande," and two silvered bronze plaques by Antonio Gardet.

The members of the society entitled "Amis des Monuments Parisiens," together with some well-known artists, have been making an archæological expedition with the view of studying the remains of the old Louvre of Philippe Auguste. The visitors, conducted by M. Guillaume, the architect to the Louvre, went through the vast subterranean vaults of the old Louvre, principally those below the Salle des Caryatides and the gallery of the Venus of Milo. In the course of the promenade they discovered, in a sewer of the time of Pierre Lescot, an engraved stone, bearing the date 1567, and a carved representation of a soldier of the reign of Charles IX.

Last Saturday the Académie des Beaux-Arts proceeded to the election of two corresponding members in place of M. Fraikin, the Belgian sculptor, and Mr. Hunt, the American architect. M. de Vigne, of Brussels, was nominated in the section of sculpture, and M. Sainte-Marie Perrin, of Lyons, in that of architecture.

By the time this letter appears, Parliament will probably have pronounced on the important question of the scheme of taking the Paris sewage to Achères. The scheme of the Municipal engineers, which is a kind of heritage to them from the late Durand Claye, has encountered violent opposition in the environs of Paris, especially in the Department of Seine-et-Oise, and this opposition will certainly not be unrepresented in the Chamber of Deputies and in the Senate. It is a question of the expenditure of 117 million francs on a scheme which is the inevitable outcome of the theory of "Tout à l'égout." On the other hand, the inhabitants of places on the Channel coast are equally opposed to a counter-scheme for taking the Paris sewage into the sea. The one scheme is denounced as creating a large circle of pestilential land around Paris; the other as likely to drive away for ever from the Normandy coast the numerous bathing-season visitors. Without endeavouring to anticipate the conclusions of the Government, we may observe that the construction of the purification works for the sewage at Clichy, in connexion with the Achères scheme, is actually in progress. It is from this point that the syphon pipe is to pass the Seine, carrying all the sewage brought down by the main sewer from Asnières, and which at the present moment is contaminating the whole river as far as St. Denis. This part of the work has been entrusted to M. Berlier, the engineer who projected the tubular railway scheme. He hopes to have completed his work by next August. The syphon-drain will consist of an iron pipe, 2½ mètres in diameter, with a cement lining. It will emerge on the left bank of the river, after having traversed the two arms of the Seine, separated by the "Ile des Ravageurs." The length will be 480 mètres, and the cost is estimated at a million francs.

The late sculptor Cavelier, whose recent decease has been recorded in our "Foreign" notes, was born at Paris in 1814, and studied under David d'Angers. He obtained the Prix de Rome in 1842, and on his return from the Villa Medici he rapidly made a reputation, crowned by the award of the Medal of Honour of the Salon in 1849. The statue which gained him this honour was his "Penelope Endormie," certainly one of his finest works. From this time he received numerous commissions from Government, and took part in some great decoration schemes. Among his best known works may be mentioned "Jeune Grecque remportant le Prix de la Course"; the statue of St. Matthew; the portrait statue of Mgr. Affie, which is in Notre Dame; that of Pascal, placed in the arcade of the Tour St. Jacques; the "Fame" in front of the Galerie d'Apollon; the caryatides of the portion of the new Louvre; the "Francois I." in the old Hôtel de Ville, &c. Cavelier also executed numerous busts of celebrated personages, amongst them those of Ary Scheffer, Horace Vernet, Henriquel Dupont, and Napoléon. He was a very learned and conscientious artist, whose work recommended itself by elevation of style as well as excellence of execution. He was officer of the Legion of Honour since 1861, Member of the Institut since 1865, and Professor at the École des Beaux-Arts. Among his pupils were many of the best French sculptors of the day—notably MM. Ernest Barrias, Idrac, Guillaume, Coutan, and Charpentier.

We have to mention also the death at Versailles of M. Dussieux, a literary man of distinction and an able art-critic. We owe to him two excellent books, "l'Histoire du Château de Versailles" and "Artistes Français à l'Etranger." He was seventy-nine at the time of his death.

THE ADVANCEMENT OF ARCHITECTURE.

ROYAL ACADEMY LECTURES BY PROFESSOR AITCHISON, A.R.A.—LECTURE V.

THE Renaissance, as far as architecture is concerned, is one of the strangest episodes in history, and though so many have tried to explain it, and amongst them men of such ability and research as the late J. A. Symonds, it still remains somewhat of a mystery. Its effects on architecture have been so fateful that it is necessary to treat of it at some length. Up to this partially antiquarian revival architecture had run a continued race; the torch had been handed, it is true, sometimes to a civilised, sometimes to a savage, and sometimes to a barbarous runner, but they all ran forward in what they supposed to be the right direction, but when it was handed to the Renaissance runner, he ran back.

It was most fortunate that Greek architecture fell into the hands of the Romans, though architects have of late deplored it, because there is only one imaginable case in which it could have fallen into better hands—*i.e.*, if there had been a nation to receive it, which was gifted with the same culture, the same acute perceptions, with greater invention, and with grander and more complex requirements. But to imagine this is to suppose there was such a nation; while in fact no such nation then existed, or has since, unless we consider that the Florentines of the fifteenth century answer to this description. Greek architecture had reached perfection in the lines it had started on; it was "The one thing finished in this hasty world." If the Romans had been artistic instead of the reverse, they could have done nothing more with it, except use it on a larger scale; fortunately they were not artistic.

The best of them could but just perceive the merits and perfections of Greek architecture, while the bulk of the nation had never seen it, and if they had would have preferred Roman architecture. The Romans, being a conquering and building nation, with a knowledge of the arch, not only Romanised the debased Greek orders but tried to make a compromise between an arched and a post-and-lintel style; this compromise was only temporary and ended in the displacement of the lintel by the arch; this displacement was not absolutely consummated till after the seat of Empire was transferred to Byzantium. The savages who had overrun the Western part of the Roman Empire, as they gradually got partially civilised, produced from the Roman and Byzantine buildings and their ruins, a style we now call Romanesque.

These savages were nominally converted to Christianity, and finally advanced to barbarism. They tried to preserve from conflagration the temples they had built to their new faith. The only way of doing this was by using ceilings of masonry; but their skill was not equal to this, except where the spans were small. At the very end of the eleventh century these barbarians, who had only just begun to settle down, made a military tour through Europe, Asia Minor, Syria, and Palestine, and thus became acquainted with the masterpieces of ancient architecture, with those of the contemporary Byzantine Empire, and with the new architecture of the Saracens. During the time the Crusaders still held places in the east, the geometrical studies revived by the Saracens had become the fashion, and some advances in philosophy had been made, in which rationalism held a conspicuous place.

In the east the Westerns saw pointed arches commonly used, and adopted them, and gradually found out how the adoption of pointed vaults would help them over their difficulties; they also learnt by experience the strength of various sorts of stone, and more or less to properly abut the thrusts of arches and vaults by the aid of buttresses and flying buttresses, and eventually they cut away and turned into windows almost the whole of the screen walls between the buttresses, while at the same time they invented new methods of adornment. How new forms and arrangements in art could ever have been invented is to us incomprehensible and almost miraculous. Miraculous interventions in aid of architects which had been so frequent in pagan and Romanesque times, ceased to occur as soon as the architects had learnt to build.

The new and marvellous architecture we call Gothic, spread, and specimens of it may be found from Scotland to Cairo and from Scandinavia to Madeira and the Canaries.

Towards the end of the fourteenth century skill in stone-cutting was preferred to æsthetic effect; it was in the eyes of the people of those days the one thing needful, hence the slight external pierced screens, the interpenetrating mouldings, and eventually the fan tracery on pendants; and though a little grace began to be imparted to the work, there was an inclination to make everything wiry, and not to leave a morsel of the surface plain for the eye to rest on.

Italy from the thirteenth century seems to have been singularly wanting in architectural schools. The Gothic brought by French and German architects was used in Italy mainly as decoration, except at Milan, which seems to have been wholly in artistic dependence on Germany. No really organic Gothic is to be found in the upper part of the Peninsula, some form of Byzantine, Romanesque, or decorative Gothic being mostly used to the end of the fourteenth century. The clergy's business being to look after peoples' interests in the next world made them wholly indifferent to their interests in this world. And they first had to combat the elegant paganism and luxury of a decayed civilisation, and therefore discouraged learning, not only as useless, but as favouring paganism and philosophy, and as being opposed to the view that this world was but a vale of tears.

After the invasion of the savages, and during the dark ages, besides having to nominally convert the conquerors, the clergy had to try and infuse into these ferocious, bloodthirsty, and brutal savages, some respect for law, order, and industry. The liturgy and the Bible being in Latin, the grammar could not be properly taught without examples from the poets, orators, and historians; and these, as well as the works of the Roman lawyers and the Classic philosophers, were necessary for the teaching and mental enforcement of law and order, so that we find Dante speaking of most of the Latin authors and of the principal Greek poets and philosophers. The works of such Greek authors as were known were translations into Latin of the Arabic versions. Dante, the great Mediæval poet, died in the first quarter of the fourteenth century. His immediate successors, Petrarch and Boccaccio, became humanists—that is, were more devoted to the learning, knowledge, and culture beneficial to man here, than to theology. In Scotland the humanities are still a branch of education, and comprise grammar, rhetoric, poetry, and the classics. Dante had seen how superior the Latin classics were in style to the Mediæval writers, and adopted Virgil as his guide in poetry. Niccola Pisano, the architect and sculptor, who died when Dante was a boy, had made the same discovery in regard to sculpture—*i.e.*, that Roman sculpture was very superior to Mediæval carving, and had adapted for his pulpits the figures from a Roman vase and sarcophagus. Brunellesco, the sculptor, who was born in 1377, the year after Petrarch died, knew one of the celebrated humanists; he went to Rome to study the Pantheon and other domes, so that he might fit himself to dome the cathedral at Florence. He must also have been affected by the rising taste for classical studies, which was in the air, and was probably struck at Rome with the superiority of the old architecture; at any rate, he is believed to have been the first who designed and saw carried out the revived forms of Roman architecture.

It is necessary to say something about Vitruvius, as his work had great influence; every scholar thought Vitruvius contained the recipes for this fine Roman architecture, that all were bound to admire. Professor Cockerell believed that Vitruvius was known and studied during the whole of the Middle Ages. He says: "The church in the Castle of Nuremberg, built by Barbarossa in 1158, and the Fraumkirk in the centre of that great city, probably of later date, are exact illustrations of the "Temple in Antis" of Vitruvius, as given by Cæsariano (lib. iii. fol. 52.)—"The Architectural Works of W. of Wykeham." C. R. Cockerell. 8vo. 1846. Pamphlet.

We see from Cæsariano's cuts and annotations that the Mediævals had applied Vitruvius' classification of the temples from the outside to the inside, so that a decastyle temple was a church with ten pillars to the nave, a dipteral temple had two aisles, and a pseudo-dipteral an aisle of double the usual width. I believe the codices of Vitruvius now known are of the ninth, tenth, eleventh, and twelfth centuries. An unbound MSS. volume of Vitruvius's is mentioned by Beccadelli as belonging to him, and when Alphonso "the Wise," who was going to trust entirely to Vitruvius for the additions he was about making at Naples, received the leaves, he

made the celebrated remark, "It is not becoming that this important book, which teaches us so well how to cover in ourselves, should go about uncovered." Beccadelli lived from 1394 to 1471. The Editio Princeps of Vitruvius is without title, place, or date, but is believed to have been printed by G. Herolt, and published in Rome about 1486; it was edited by Sulpitius from a codex found by Poggio Bracciolini at St. Gall about 1414. The concurrent circumstances of a passion for style, beauty, and delight, for intellectual freedom, and for the study of the classic authors, turned the thoughts of Italians towards Rome.

The knowledge that Rome was once not only the capital of Italy, but the centre of an empire embracing the ancient civilised world, and was then full of splendid buildings, some of which remained, while the sublime ruins of others attested the fact; the absence of any organised style or organised schools of architecture, made even those Italians, who cared not for architecture, violent partisans of a revival of ancient Roman art.

It became the fashion, too, to call Byzantine, Romanesque, and Mediæval architecture, Gothic, Arabo-German, and the "tasteless style."

Architecture got into the hands of scholars, antiquaries, goldsmiths, painters, and sculptors, and became, as Michelangelo called it, a branch of the art of draughtsmanship. The belief that the architecture of Rome was perfect certainly held full sway in the civilised world until 1768, when Milizia published "The lives of Celebrated Architects."

Florence, which has been called the modern Athens, and was said by Boniface VIII. to be the fifth element, was the natural place for new views on everything to spring up, including the fine arts. The probability is that Brunellesco, having gone to Rome to pick up something about domes, was so much struck by the style and dignity of the Roman remains as to induce him and his companion, Donatello, to measure them. On Brunellesco's return to Florence, he naturally advocated a return to Roman architecture; but, had this accident not happened, it could only have retarded the movement by a few years.

Students, writers, sculptors, painters, men of active intellect, and those who wanted to enjoy life, were all led the same way. The proverb which says that "All Roads lead to Rome" was then true.

It must not be forgotten that the discovery of the West Indies and South America by Columbus at the end of the fifteenth century, and that of the motion of the earth round the sun by Copernicus, were very practical comments on the advantage of a free exercise of the intellectual powers.

The fame of the discovery of an ancient codex of Vitruvius by the Papal Secretary, must have awakened a new interest in the work, though there were possibly a few MS. copies about. Vitruvius being printed at Rome must not only have made it more accessible, but more talked about, and have thus drawn attention to the fact that in it were to be found the recipes for the manufacture of that architecture so much admired by all men of taste. We must recollect that as there were no schools of architecture, painters or sculptors who had been employed on buildings were thought fit to be architects.

Early in the fourteenth century, Niccola Pisano, the sculptor, was taken off to Naples by Frederick II. as his architect, and subsequently Giotto, Taddeo, and Agnolo Gaddi and others were so employed at Florence—occurrences that would have been wholly impossible in France, for, notwithstanding the extraordinary capacity and versatility of these early Italians, they could not have drawn the lines for complicated stone-cutting without a special education. It must be admitted that Brunellesco, who was a most acute man, did turn himself into a constructive architect by means of effort and private study, though he would have done better to have gone to Constantinople than to Rome, for doming was there a well-known art.

Leon Battista Alberti, whose mighty personality still affects us, like that of Leonardo da Vinci or Michelangelo, was the successor to Brunellesco. He was one of the extraordinary men that Italy produced at the Renaissance—a Latinist, who passed off his play on Aldus as a Classical work; who, besides his wit, his engaging manners, and his skill at manly exercises, was poet, mathematician, painter, sculptor, architect, and writer on manners. He became a Canon of the Cathedral of Florence to have time and opportunity for study, and is said never to have wasted a minute. He built some churches, altered San Francesco at Rimini into Malatesta's Temple to Isotta, within whose external arcades are the tombs of some of the great Greek and Italian humanists—Gemistos Plethon, for example—and also built the Rucellai Palace at Florence.

It is very difficult for us to put ourselves in the place of the cultivated Italians of the fifteenth century. We are sick of the orders, for we have seen little else on the important monuments of the last three hundred years, and every architectural pupil has drawn them out.

In Brunellesco's and Alberti's time they were not only new and superior in style to anything the people had seen, but were hailed with delight as symbols of ancient Rome—that Rome that was once so great, whose splendid literature had not only charmed them, but had freed them from asceticism, and from the mental thraldom of the clergy. A capital, a griffin, a torso, a coin, an engraved gem, or a bit of foliage enraptured everyone; these were fragments from the hands of those great and good Romans who did everything so nobly and so well, and who lived in freedom and happiness like the gods. Rabelais' book of Garagantua and Pantagruel is a ribald one, but, as far as I know, it alone gives some notion of the feelings of mankind at the Renaissance, and that, too, without the darker traits of Italy. You must read the "Murderous Machiavel" for that; however, J. A. Symond's work on the Renaissance is enough for most of us, and for the graver side of learning, Milton's poems give us some idea of the variety and vastness of the attainments at the Renaissance. The idea was this, that there was to be great intellectual cultivation and curiosity, great splendour, great personal achievements, and great enjoyment, but the only law was to do what one best liked, which was to result in perfect happiness. What it did result in, in too many cases, was a return to the worst vices of paganism, in which distinguished men too often indulged, almost without a reproach; Benvenuto Cellini's biography is a fair picture of artist life. Nothing like this licence has occurred since, till the orgies of the French Revolution, when everyone was to be good and happy, after all the wicked aristocrats had been butchered. It is only reasonable to suppose that, when architecture mainly took the form of decoration, and was carried on by accomplished figure draughtsmen of the acutest intellects and the most refined taste, that the product would approach perfection. The proportions attained in the best examples were altogether lovely. At the beginning of this antiquarian revival, many of the smaller semi-architectural works, such as tombs and monuments, were so beautiful as to be almost divine, only the divinity was a Roman one. The enormous superiority in style of these monuments over their Gothic precursors cannot be better seen than in "the Sepulchral Monuments of Italy" by the Arundel Society. I may mention the monument to Leonardo Bruni by Rossellino, 1444, and that of Carlo Marsuppini by Desiderio da Settignano, 1453, both at Sta. Croce—a cast of the latter is at the South Kensington Museum; that of Barbara Ordelaffi, 1466, at Forli; those of Bernardo Guigni, 1468, and of Ugo, the Marquis of Tuscany, 1472, both by Mino da Fiesole, and at the Badia, Florence; that of Pietro da Noceto, 1470, by Matteo Civitale, in the Duomo at Lucca. Those at the Badia, and that of Marsuppini have some of the panels of dark purple porphyry, which is a most simple and effective way of getting monumental colouring.

Practically there were no examples amongst the Roman remains of the building wanted, so such buildings as had been done by Byzantine, Romanesque, or Gothic architects had to be followed as models, and on these the Roman architecture and ornaments were grafted, or Roman architecture was substituted for the old forms; enriched too by a taste and spirit that the Romans did not possess.

The great prison palace of Florence the Pitti, attributed to Brunellesco, brings to one's mind nothing but thoughts of the dungeon and the rack, however fine it may be as a mass. The Rucellai Palace, by Alberti, however, is lighter and gayer, although the main walls and archivolts are rusticated; it has three orders of pilasters, with their entablatures, and is cut up into apparently equal divisions, except where the two doorways occur, and in these the spaces are a little wider; round arches with very deep archivolts fill up the space between each pair of pilasters, and are formed into double-arched windows by a central column: the ground floor is lit, after the old Florentine fashion, by square windows about 15 ft. from the ground, to prevent the inmates being shot by a passing enemy.

The third great architect of the Renaissance, Bramante, built one of his most delightful works, the Cancellaria, at Rome. This front is also like that of Rucellai, regularly but unequally divided by pilasters, which might almost be called coupled above the ground story—*i.e.*, there is a narrow space and a wide space alternately between the pilasters; the narrow space is blank, while the windows are in the wide space. The front, however, has graces that the Rucellai Palace cannot pretend to, for besides minor points that add to its beauty of composition, the round-headed windows are enclosed by square lines.

The other great and characteristic palace is the Farnese, supposed to have been built by Antonio Piccone, who took the name of his uncle San Gallo. Here the front is treated as a whole, the frieze and cornice being proportioned to the total height of the building. This palace has no columns or pilasters, but is treated wholly by windows. The ground-floor windows have dressings and a cornice without a pediment; those of the first, or noble floor, have alternately triangular and segmental pediments, and the top floor has only triangular pediments. Michelangelo is said to have had some say or hand in the matter, to which the simple grandeur of the whole, as well as the botches of the first floor centre window and the arched openings in the second floor, give some colour; the cornice is said to be by Vignola. Whoever designed the Farnese Palace had mastered the law of repetition without variety, which gives such dignity when properly done. The rusticated carriage entrance is too narrow for the front, and is too inconsistent with the rest of the architecture.

Venice is the next place where we can study the charms of the Early Renaissance.

The outside of the Sta. Maria dei Miracoli at Venice is delicate and picturesque, and the inside is even more so. The altar-screen, which is pierced, is after the best Roman models, when Roman art was interpenetrated with Greek forms. This church, together with the Vendramin, Spinelli, and Manzoni palaces, are attributed to some of the Lombardi, the family which did so much, in the Early Renaissance times, for the architectural and sculptural adornment of Venice.

In these examples the Roman decorative use of the column is followed. It is curious how the Roman orders became an object of worship even to our own time. M. Paul Sédille, whose review of modern English architecture we have all read with such pleasure, wrote a life of Joseph Louis Duc, the architect of the July Column and the Law Courts. In it he quotes the following opinions of Duc on the orders: "Without the order what would our monuments be? Is it not the order which, by its proportions, regulated by those of man, becomes the unit and measure of buildings?

What confusion would at once be produced if the order were suppressed! The strangest proportions, sometimes shortened and crushed, sometimes of a height without limit, would form an incoherent whole, which might for an instant astonish and dazzle the eyes, but could never charm them." M. Sédille then adds this:

"So M. Duc thought that without the employment of the order, construction and not architecture could alone be produced." He reminds us that, "Even in the Middle Ages, the orders were incorporated in the pillars, at first on their principal faces, then on the angles and on the points which mark the effort of carrying weight. It was the condition of beauty in these monuments, in spite of the sacrifice of all proportion in the orders. Without these last vestiges of poetic essence, there would only remain masses of inert matter."

Duc's remarks form a graceful prologue to what I am about to say. His profound study of Roman architecture had somewhat biassed his taste, though not his judgment; for it is evident he did not quite mean what he said. He felt the charm of those gradually-perfected proportions in the Roman column, as who has not? but he also felt that he could condone the want of classical proportions if he got the column; that is a shaft, simple or compound; if the duties the column had to perform were architecturally marked, the capital condensing all the pressures that came on to it, into the shaft, and the base spreading the concentrated pressure of the shaft on to the earth. The column is but a pier to support direct compression, rounded both for convenience and beauty, and, as I have just said, its capital is to concentrate pressure, and its base to spread it. The proportions of the shaft show the architect's knowledge of the strength of the material, and of the necessary statical conditions; the architect's business is to make it properly

express its duties in accordance with the character of the room or the building. The constructor is ignorant if he uses ten times as much material as is wanted; so a column of wood, of soft stone, of hard stone, of marble or of iron will vary in proportion to the strength of the material; and the architect is a bungler if he cannot make the proportions right, characteristic, and becoming. The burly porter may carry a heavy weight on his back, and if he carries it we do not ask for grace; but if we want it carried by an athlete we want it done gracefully and without a painful effort being apparent; it is the difference between Atlas and Herakles.

The floral elegance of a Corinthian capital carries us away, but it has a rather unstable look, and is not to be compared to the Greek, Doric, or Ionic for propriety of expression.

I may here remark on the advantage in point of symmetry, in the Vitruvian sense, of the use of one uniform material throughout a building. Granite and marble columns, if proportioned according to their strength, look too slight for a superstructure of freestone, and the disproportion is still greater when a cast-iron column is used. We can bring ourselves to support the conjunction of iron with brick or freestone by an effort of the understanding, but this effort rather breaks the continuity of our visual satisfaction. The best solution I have seen of cast-iron columns carrying masonry was at the Paris Exhibition of 1889. The early Romans had very little taste for the fine arts, and probably had few sculptors amongst them. They had admired the Greek temples; and entablatures with their columns were looked on as symbols of art. When columns were no longer wanted to support architraves, they were still looked on as essential to architecture. In the forum of Nerva there are splendid columns, but to make them more effective they were not kept under the main entablature, but were projected out, while the entablature over them had probably nothing to carry but a vase or a statue. Earlier than this, when the Flavian amphitheatre was designed, it was enriched by a series of stories of columns with entablatures to each, so that its appearance is that of an oval many-storied temple, between whose columns another structure has been inserted.

Antique Roman work was considered by the Italians of the Early Renaissance as perfect, and to be imitated; for you must recollect that the Renaissance architects were not architects according to our view; but were sculptors, painters, or goldsmiths who wanted to make the exterior of their buildings agreeable, and were therefore not shocked by any kind of structural absurdity. With them columns did not represent a purely constructive feature made beautiful, but were looked upon as beautiful, and convenient things for cutting up a surface. This view is even now hardly extinct, and was in full vigour up to a comparatively recent period. Many of our public buildings, and perhaps even more of our grand corporate and private buildings, have the appearance of being built within the colonnades of ruined temples; and it is fortunate when the temple stands on the ground, and is not raised on a lofty basement, which takes away the very semblance of reality, and shows the pure folly of the proceeding. There are excuses to be made for these vagaries, among nations and in times when sculpture was unknown, or was in such a debased state that it could produce no emotion, and was like rude, early sculpture, really used as picture writing to tell a story. But we now have admirable sculptors, who could tell us all the emotional stories of the past and convey to us every perfect form of human beauty. They cannot, of course, express any stirring incident of the present day, because our clothes not only blur all form in repose or action, but are in themselves too ignoble to raise anything but laughter or contempt. I consider it most despicable to ornament a building in the present day, by covering it with useless columns, blind arcades, or common geometrical forms, when it had much better be left plain, if fine sculpture cannot be afforded to enrich it. There was something to be said for the geometrical patterns of the Saracens, for they not only appear to be insoluble, but the Moslems were discouraged from using figure sculpture.

To continue the account of the Roman revival in Renaissance days, I may say that so long as Roman work was used to add interest, novelty, and style to the forms in use, the work had always some charm; but when the architects of the latter part of the fifteenth and the early sixteenth century had got a recipe for Roman architecture, its use was mainly a proof of study and a good memory, it ceased to be interesting. The same thought which induced Serlio, Palladio, and Vignola to publish measurements of the ancient Roman buildings and correct specimens of the orders, and to recommend their use, occurred to the Irishman, if an apple-pie was made so delicious by a little quince, how delicious would it be, if it were all of quinces. Gradually architecture became a scholastic exercise in a dead language, in which false quantities were a graver offence than the want of proper expression or invention. At last architecture became the dullest sort of pedantry, when it did not fall into contortion. An architect may be allowed to use a Classical column, even with the perfect Classical proportions, if those proportions are wanted to carry the weight; but as this use of it would require nothing but a little statical knowledge, it must be looked on in the same light as a quotation by a modern poet from the classics, not quoted for the sake of letting the poet's memory serve the turn of invention, but to show his admiration of the gem, by setting it. All columns, however, should be excluded that were not wanted to carry weight; and even for these an architect should generally be recommended to use some new or elegantly altered form that would attest his originality.

John Addington Symonds, after stating that the Renaissance architecture created a new common style for Europe, makes the following prophecy,—"With all its defects, it is not likely that the neo-Roman architecture, so profoundly studied by the Italians and so anxiously refined by their chief masters, will ever wholly cease to be employed. In all cases where a grand and massive edifice, no less suited to purposes of practical utility than imposing by its splendour, is required this style of building will be found the best. Changes of taste and fashion, local circumstances, and the personal proclivities of modern architects, may determine the choice of one type rather than another, among the numerous examples furnished by Italian masters. But it is not possible that either Greek or Gothic should permanently take the place assigned to neo-Roman architecture in the public buildings of European capitals."

Granting his assumption, that architects must copy something, I agree with him; but I do not grant his assumption. If I did, both this and the last course of lectures would have been time wasted, both for the speaker and for his hearers. I say that architecture is an organic art that must change with our knowledge and skill in construction, more particularly when we have materials of vast power scarcely known to the ancients. I say, too, that we have new tastes and different emotions to express. We must learn from the past the language of architecture and the methods by which emotion has been produced, and, when this language and these methods have been learnt, we must all try to express the emotions of our day. If emotions be but feeble now, the time may come when they will be stronger and when they will be more earnestly desired.

There have been some great movements, even in my time, that I hope promise well; one certainly does—the pursuit of truth. Speaking of the intellect, the pursuit of truth is now getting to be looked on as man's highest duty, and we shall eventually have temples to it. We are also coming to believe that the investigation of the laws that govern the world and those parts of the universe that are within our ken, are the most valuable parts of knowledge. Few will dissent from this opinion, for the slight glimpses we have gained have not only made us like the fabled magicians of old, and cut us adrift from the past world, but have added enormously to our power, our comfort, and our wealth.

The putting the keys to knowledge in the hands of the rising generation must have striking results, and the passing of every child through the Board School sieve, and making what openings we can for those specially gifted to use their gifts must, if not mismanaged, greatly add to the effective power of the country. Democracy, again, is a vast power, which we hope the sagacity of the nation will direct in the right way. One cannot help thinking that workmen will learn that they cannot raise their wages by being idle, nor by destroying the wealth of the country, and may, therefore, use the wealth they now squander in strikes, for building themselves magnificent halls which will throw the Halls of the Confraternities (Scuole) of Venice into the shade. We may also hope that moral philosophy will be greatly extended on a new basis, and that the multitudes who go to learn its lessons may desire to be housed conformably with the importance of the subject; and, lastly, that our legislators may learn that the most striking lessons can only be given to the bulk of men by the fine arts.

Something must be said about sculpture, and by sculpture I mean what the French mean, viz., the carving well of vegetable or animal forms, as well as the human figure. I presume it to be admitted that the Egyptians carved animal forms in the most monumental way. The purely natural forms of the animals have been so abstracted or modified by them as to make them perfectly harmonise with the monuments they adorn. The Assyrians doubtless gave the most vigorous and lifelike representation of animals, but they do not so well harmonise with monumental structures. In the case of man, the Italian Renaissance masters undoubtedly added new phases of treatment. There is a peculiar charm about their naked children which is quite different from that of the Greek sculptors or their Roman imitators; and some of the greatest of the Renaissance masters gave a mystery, a look of passion, or of Christian resignation to the human face, which was not found in antique sculpture. The helmetted figure in the Medici Chapel, by Michelangelo, is perhaps the most striking example of inscrutable mystery.

Though there are, perhaps, no examples of Renaissance foliage that are quite equal in monumental expression, in dignity and simplicity of treatment to the very best Roman work, there was a greater look of vitality, and greater invention amongst some of the best Early Renaissance work. I should hardly like to affirm that the very best Renaissance sculptors exceed in perfection of treatment one or two examples of the best Roman work, except, perhaps, in the very flattest kind of bas-relief; but there are, undoubtedly, hundreds of examples of Renaissance work that were superior to Roman, for these Italians of the valley of the Arno were much greater artists than any Roman. But what is to be found fault with in the Renaissance is the feigned admiration for griffins, gorgons, and chimeras, sacrificial instruments, and skulls. The club of Hercules and the lyre of Apollo did really appeal to Roman sentiments and beliefs, but with the Italians it could neither recall the same belief nor the same sentiment; they were like the bulls' heads we now see on Banks. The Renaissance men were merely trying to think that they loved these things; just as the modern imitators of Gothic try to fancy that they love ill-modelled Gothic images better than the most perfect sculpture of the beauty or vigour of the day. If architects are content to be the mere decorators of buildings somebody else has constructed, then if they are to do it well they must proceed in the same way that the Renaissance men did. They must first apprentice themselves to working goldsmiths, then become sculptors, and afterwards learn the few architectural rules that are wanted for architectural designers. As far as floral ornament is concerned, the modern sculptor architects must learn to love something, and to treat it with the same mastery that the Greeks treated the honeysuckle or the Romans the acanthus. I think it is impossible for any large number of architects to become sculptors as well as architects if they desire to practise architecture as a structural and progressive art. We not only find that the devotion of a lifetime is wanted to make figure sculptors eminent, but even to produce admirable ornamentalists. Hence we conclude that unless an architect has that wonderful and many-sided capacity that characterised Alberti, Leonardo da Vinci, Michelangelo, or Wren, he can scarcely hope to be a master in his own profession and to rival the sculptors and ornamentalists in theirs.

It is said by many that if architects cannot equal the works of the past ages in a new direction, the best thing for them and for the public is to copy or closely paraphrase past works. If the architect is really the poet of building, he must by so doing necessarily lose that appellation—he ceases to address his generation in language that moves them. He is no longer an original poet, but a copyist, or a paraphraser. The poet who merely paraphrases Milton, Dryden, Pope, or Tennyson, although he would be as sure as the architect is to add certain elements which belong only to his own day, could not be looked on as a poet, but only as a skilled workman who creates no emotion. He would merely be said to be a good paraphraser of Milton or of one of the rest. You may be sure that every poet, to say nothing of every great poet, has paraphrased the best pieces of the great poets with whose language he is acquainted. He may even, and probably has, quoted from some of the best; but the bulk of his thoughts, his emotions, and his style must be of his time, his nation, and himself. You cannot teach this gift. All that you can do is to

teach the rules of the art, so as to render the man capable of expressing what he has to say. If he has nothing to say, but is the master of the art of speaking; well, you can only call him a stylist. One of the main objects of these lectures has been to stir the emotions of those who feel that they have something to say in architecture, and also to recommend the methods of learning expression, and of pointing out some of the ways in which a certain divergence may be made from previous work. Even cookery, in its higher form, cannot be taught by recipe; but a very commonplace person can be taught to make things more or less palatable and digestible, which his own unaided intelligence would never have enabled him to do. It is not so very uncommon for the deep study of a subject to reveal to the student, powers in that direction that he never suspected; although I think that this can rarely be the case with those of the greatest capacity. I am inclined to think with the French poet, "that the thorn that does not prick when it is born, will never prick at all." If this were not so, we must have lost the creations of very many geniuses.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE ninth meeting of this Institute for the present session was held on Monday last, at 9, Conduit-street, Mr. J. Macvicar Anderson (President) in the chair.

The President stated that, as intimated at the last meeting, Mr. Middleton had resigned the post of auditor to which he was elected. It was, therefore, necessary, under the terms of the by-law, to elect an auditor in his place.

On the motion of Mr. William Woodward, seconded by Mr. H. Burrows, Mr. F. W. Marks (Associate) was elected auditor.

The President next announced that an Intermediate Examination, to qualify for registration as student, was held on the 20th, 21st, and 22nd inst., when thirty-eight probationers applied, thirty-six of whom were admitted, and of these thirty-five presented themselves and were examined; twenty-one passed, and twelve were relegated, in three, four, or five separate subjects, and two in all subjects. The majority of those relegated failed in subjects two and four, viz., "the several varieties of Classic ornament" and "the characteristic mouldings and ornament of each period," in which accuracy of delineation was indispensable. No one need feel disheartened at being relegated; on the contrary, it was found by experience to be of the greatest possible advantage to the students that they should be relegated, because they "had thereby the opportunity of making themselves much more acquainted with the subjects than they were before." The twenty-one who had passed, placed in order of merit by the Board of Examiners, were as follows:—C. F. Innocent, Sheffield; G. Thomson, Leeds; J. Hunt, 18, Dorset-square, N.W.; H. A. Chapman, Scarborough: P. C. Blow, St. Albans, Herts; R. H. Owen, 293, Clapham-road, S.W.; C. O. Nelson, 16, Scarsdale-terrace, Kensington, W.; L. B. Price, B.A., Oxon, 64, Cannon-street, E.C.; S. Owen, Newholme, Grappenhall, near Warrington; G. H. Devall, Birmingham; H. Shepherd, Richmond, Surrey; R. H. E. Hill, 3, Lombard-court, Lombard-street, E.C.; C. W. Harris, Liverpool; H. M. Potts, Newcastle-on-Tyne; G. H. Grayson, Liverpool; A. Harrison, Stockton-on-Tees; P. C. Newman, 33, Cologne-road, New Wandsworth, S.W.; W. R. Mosley, Leeds; E. C. Aldridge, Liverpool; R. Rich, Newcastle-on-Tyne; E. Borissow, Cambridge.

Those 21 probationers who had passed, added to the 15 who passed in November, increased the number of the students of the Institute to 109.

The New Science Laboratories at University College.

Papers were then read on "The New Science Laboratories at University College, London," by Professor T. Roger Smith, Professor T. Hudson Beare, B.Sc., M.Inst.C.E., Professor J. A. Fleming, M.A., D.Sc., F.R.S., and Professor G. Carey Foster, F.R.S. The papers were all read by Professor Roger Smith, the first being his own. The object of the paper was to describe the additions and alterations which had recently been carried out at University College, London, in order to form a series of laboratories, buildings devoted to the practical study of science and applied science, sufficiently extensive and complete to be worthy the attention of members of the Institute at a time when technical scientific teaching was one of the prominent subjects of the day. The first engineering laboratory set up in the United Kingdom had been that established by Professor Kennedy in the year 1878 at this College, in a basement not well lighted, certainly spacious, but with no other special adaptation to the purpose than that it had a solid floor; and most of the numerous engineering laboratories which had been since established had far better buildings provided for them. It was for the many students now working in this department, which had thriven exceedingly, that a new and suitable laboratory, together with a spacious and light studio for mechanical drawing, was urgently required. The departments of electrical engineering and physics also required better accommodation. No unoccupied land remained at the disposal of the Council on which a building supplying what was required could be erected, except a small part of the south quadrangle in the rear, and the space along the western or Gower-street front of the great front quadrangle. The new physical laboratory, which, however, furnished only a small part of the accommodation needed for physics, was accordingly erected in the rear, and to the electrical and engineering laboratories part of the front space was allotted. Designs were made providing for the largest amount of space compatible with retaining an adequate opening in the centre of the new front; and of these Mr. Brewer had made two views, which gave a general idea of what was contemplated. Very nearly the whole of one block occupying the southern half of the long frontage had to be commenced in order to afford as much ground-floor space as was wanted; but, unfortunately, only part of the upper floors was called for at the time, and financial considerations absolutely prohibited anything more being done than it was essential to do, with the result that much of the building was temporarily roofed in as a one-story building, so that externally the new laboratories looked very unfinished indeed; but each of the departments actually constructed had been entirely completed internally. In the architectural treatment of the building the details of the original had been most scrupulously followed, and towards the quadrangle the original ordonnance was in every respect continued. Towards Gower-street some small variations of great practical utility had been made, the most considerable being the introduction of a third story of openings along part of the front. The engineering laboratory consisted of a building 98 ft. by 50 ft. internal measurement, with four small rooms cut off from it at the north end, and a large space for the steam-engine enclosed by a glass partition, the remainder being quite open and full of machinery and tools. The walls were lined with white glazed bricks. The laboratory was covered by a very light temporary roof of steel trusses, slated on boarding and felt, and with a sky-light.* The floor was a wood-block floor on concrete, and where the lathes and other large tools come, blocks of cement concrete were put in to receive them. Cast-iron brackets to carry shafting were built into the walls, and gas, water, and electric light laid on. There was no basement under the laboratory, but one was formed under the buildings adjoining. In this basement there was a forge, and at the basement level, but not under any part of the building (so as to avoid any possible risk to the fabric from explosion), was formed the vault for a boiler-house. Also in the basement, but extremely well lighted, owing to a fall in the ground, was a large carpenters' shop, available for all the engineering students. In the basement there were also lavatories and a heating chamber. As the management and testing of the boiler was part of the training of the students, a spiral staircase connected the boiler-house directly to the laboratory. On the first floor, over the electrical department, a lecture theatre and a class-room and professor's private room were provided. Behind the lecture theatre a large diagram-room had been formed, and adjoining it was a dark room with a dark lobby for photography. A museum served as ante-room to all these rooms. The whole of the second or topmost floor was devoted to engineering-drawing, and graphics. In the lecture theatres the floor was flat, which he personally considered undesirable in a lecture theatre, but which the professors who used it desired. The rows of seats for students were straight, and not arranged amphitheatrically on plan. Experience showed that this answered best. The southern half of the ground story was dedicated to electrical engineering. Here, thanks to the good judgment of Professor Fleming, who knew exactly what provision he wanted, they had been able entirely to avoid corridors, except one short length of entrance corridor and lobby leading to the door of the engineering laboratory and to the staircase. Three divisions occupied the space: (1) The electrical laboratory at the south end, a large and very light room; (2) the lecture theatre, with its apparatus-room; and (3) the dynamo-room. It was quite true that the lecture theatre formed a passage room, but this arrangement the Professor deliberately adopted as consistent with the manner in which he would work his department, and it had helped in the elaboration of a very compact plan. In the laboratory, in order to secure quietness and to keep out the dust, the windows were double, and blinds which would completely shut out the light were fitted to them. Some difficulty was experienced in obtaining a material sufficiently opaque; but an admirably dense fabric was at last supplied by Messrs. Guynan, known as "opaque" cloth, and specially prepared for such purposes. Strong and thick stone slabs for tables were built into each pier at about table height, and formed steady tables to carry various measuring instruments. Similar slabs were provided in the north wall, and all windows had them in place of the usual window-board. This had been found to be an excellent way of obtaining a perfectly trustworthy support for delicate apparatus. The lecture theatre had an apparatus-room lit by electric light quite close to the lecturer's platform, and the channel for conveying wires to the laboratory passed absolutely under his table, so that any connexions required for lecture purposes could be made with the utmost facility—indeed, the keynote of the whole disposition was that the Professor at his lecture-table had his whole department round him, and could literally touch the wires leading to and from everywhere. Even the darkening of the windows of his lecture-room could be done from the table. Adjoining was the dynamo-room, where the electricity is generated. The floor of the dynamo-room was a most important part of the structure. After a good deal of consultation the following mode of construction was adopted. After excavating the solid earth to the required depth, a mass of 2 ft. of Portland cement concrete was laid over the entire floor, with an extra depth for the bed of the gas-engine; but it was prevented from touching the walls anywhere, a space of 2 in. being left clear all round, which was afterwards closely packed with slag wool. In this concrete were embedded the anchor-plates of long holding-down bolts, and in order to secure the absolute accuracy of their position a skeleton template of the whole floor was prepared. By the help of these bolts a series of teak beams, each 6 in. by 4 in., of a dovetailed section, was secured on the upper surface of the concrete 18 in. apart; the spaces between the teak beams were then filled in with granolithic cement slightly channelled on the surface, to assist in the running-off of water. A 6-in. channel was left almost all round the room for electric light mains, and was provided with a teak cover. On the teak beams the engineers found fixing for their machinery, and could readily change its position if necessary. The accumulator-room was an important part of an electrical installation, and as the storage batteries give off acrid fumes, its ventilation was a matter of importance. It was placed in the basement, and they arranged to bring the chimney-flue from the furnace of the hot-water apparatus close to it; they carried up a separate air-flue with an inlet at the ceiling-level of the room to be ventilated, alongside of this furnace-flue, and, thanks to the fact that the flue was a high one, and to the stimulus which the draught in it received from its neighbour, they had set up a very efficient out-going current which carried off any unpleasant smells very briskly. The staircase had been constructed with an open well-hole from bottom to top, and a girder had been thrown across it at the highest ceiling-level, so that experiments on long wires or cords might be carried out. It was constructed of Walker's artificial stone, and one of the steps, formed with a small steel joist as a core, was tested by building it into a solid wall and weighting it heavily at the end, and was subsequently destroyed by dropping heavy weights on to it from a height. Its endurance before cracking showed very considerable strength, and the stubbornness and tenacity which it exhibited after its first crack, and before it was finally destroyed, gave him a very high opinion of the value of this material for the landings and staircases of a public

* If this skylight is essential for the light at present, how is the same light to be provided when the upper stories are added?—ED.

building. The walls generally were executed in brickwork in cement, the bricks being Fletton bricks, faced with Portland stone, and they stood on Portland cement concrete. The roofs were slated. Fireproof construction was not judged necessary in the floors, which were carried on steel girders. The large department of physics consisted partly of the old engineering laboratory, and the first-floor rooms and lecture theatre above it, all being altered and recast, and partly of a new building on the ground level connected to both floors of the adapted old building by a covered way, which had been already alluded to. The chief interest to an architect of this part of the work lay in the degree in which it was possible to improve the lighting of what had hitherto been a dark—or at best a very unequally lighted—department. In several places it was possible to enlarge the window openings by lowering the sills. In most it was found possible largely to increase the access of light by splaying the window-heads outside or the jambs inside, and as the walls were very thick, a really remarkable increase of light was obtained. To a great extent the old walls were refaced with white glazed tiles instead of plaster, and where new walls were built they were faced with white glazed bricks, and the result of the two operations had been to secure an increase of light which added to a remarkable extent to the serviceableness of the buildings. The new laboratory was a simple brick building, with a few mouldings executed in moulded brick round the openings, and many windows. It contained on the ground story two large laboratories and a central room. On the first floor there was one room and a photographic dark room completely fitted up. It might be noticed that a long stretch of space could be obtained against the rear wall by setting open the doors, and that a window occurred at the end of such space. This had been arranged to admit of experiments on rays of horizontal light of considerable length. All round the walls solid stone tables similar to those already described were built in, and gas was taken to every working table. The floor was solid, resting on the earth, and was happily remote from any causes of disturbance. The floor of a large laboratory in the basement story of the old building was also practically a solid one, but formed specially, since the earth had been a good deal disturbed. Sleeper walls at a distance of 6 ft. apart were carried from end to end of the laboratory, carrying stout stone curbs, the top of which was flush with ordinary wooden flooring. The working tables were all constructed with legs of such a space apart as to rest on these curbs, while the students and assistants stood on the wooden flooring between, and in this way the steadiness of the tables was secured. The heating of the new physical laboratory was carried out by means of the Falkirk Iron Company's controlled combustion stoves, and by open fireplaces in the smaller rooms. The rest of this department was heated from the low-pressure system, which warmed the college buildings generally. In the new wing it was decided to employ a "medium pressure" apparatus, and though his prejudices were not in favour of this method, he was bound to admit that the ease with which it could be introduced into every part of the building, and the large amount of heat which it threw out, were very much in its favour. All the three new departments were lit by electric light. The fittings used in the engineering department were for the most part the old ones, and required no special description. The desks in the lecture theatre had been newly-designed, and were arranged so that each student had a separate desk large enough to make small drawings in addition to taking the ordinary lecture notes, and so spaced as to give the professor ready means of supervising the drawings. In the electrical department the fittings were almost entirely new. In the photometric gallery a railway was formed for moving the light to be tested; this was 22 ft. long, and carried on fir bearers. The rails were 6 ft. apart, and formed of rails out of 8 in. by 2 in., with 1 in. square ebonized mahogany strips glued and tongued on the upper edge, and the whole painted black. The distances representing candle-power up to 100 had since been calculated and painted on. In the theatre the ordinary slate or blackboard had been replaced by one of plate-glass, with a ground surface for drawing on, and backed with black cotton velvet. The lecturer's table in the electrical theatre was somewhat elaborate, and was specially arranged with a view to easily controlling the various currents obtained from the cells. In addition to four cupboards, two of which contained all the terminals, and the nest of drawers under the top, the centre portion was left quite open, and at each end a broad recess 8 in. deep was formed, and the cables from the accumulator-room, which was situated immediately below, were brought up and placed directly under the Professor's control. The fittings of the physical laboratory were mainly those already in use. If the buildings and fittings were adapted to their purpose it was very largely due to the fact that, from first to last, they were in constant communication with the Professors who were actually working in the old quarters, and were to occupy the new. An architect so placed enjoyed an advantage which, when he was preparing competition designs from a printed programme drawn up by strangers, was totally denied him, and he had in no instance been more sensible of the value of this sort of co-operation than in the present one, when he had worked in concert with his three colleagues, Professor Carey Foster, Professor Fleming, and Professor Beare.

Professor Roger Smith then proceeded to read papers on technical details connected with the fittings of the various departments (or such portions of them as there was time to read), by Professor Carey Foster, Professor Fleming, and Professor Beare. It would be of no use to attempt to summarise these papers, and to give them in any detail would be unfair to the claims of the Institute in their copyright. The whole form a very valuable repertory of information and experience as to the machinery and fittings required for technical laboratories, brought up to date by scientific experts who are thoroughly acquainted with their subject.

Discussion.

Mr. Gordon Smith said he would not attempt to discuss the details of the learned papers they had just heard. He confessed it was beyond him altogether. At the same time, he could not but admire the skill with which Professor Roger Smith had concentrated such a deal of useful accommodation on a site which he must have felt to be very confined. He noticed that the Professor had expressed his conviction that a flat room for a lecture theatre was not the best, but his colleagues in the undertaking appeared to have preferred it. He could not help sympathising a great deal with what Professor Smith had said, that for demonstrations at a lecture theatre and so on it was best to have a rising audience, in order that they might have a better view of what was going on at the table. He felt sure that the materials thus placed on record, in the Transactions of the Institute, would be of extreme value to many architects who might be called upon to design the various Technical Schools and centres of education which were being put forward throughout the country. He had, therefore, pleasure in moving a cordial vote of thanks to the four gentlemen for their papers.

Professor Kerr seconded the vote of thanks. The papers which had been read and the illustrations presented showed in a striking manner what had to be done in the way of complicated arrangements by the architect nowadays, under special circumstances. Professor Roger Smith and his colleagues had, to all appearance, produced an exceedingly complete and serviceable design in every respect. They, as architects, must see that this was but one of many illustrations of the necessity for carefully considering the interior economy of their buildings. Some of them were old enough to remember the time when a building of this sort would have been designed in a Classical manner, and constructed in a very substantial way, while the Professors of the several departments would have been allowed to settle down and do as they best could. That state of things was no longer tolerable, and he presumed that the colleagues of Professor Roger Smith had been personally required to instruct the architect in all the minutiæ of their paraphernalia. So it was with architecture now-a-days in its practical form. Those of them who were young men must look forward to the fact that, in a practical country like this, and a country which was becoming more practical by absolute necessity, in respect of science, art, and other considerations, the public would require from the architect the utmost possible skill with regard to internal organisation. He therefore thought that the illustration here afforded of the painstaking with which this organisation had been accomplished was a most important thing.

Professor Unwin congratulated University College on having been, in past times, the pioneer of some branches of scientific education, and on having brought its engineering school and equipment up to the level of some of the more modern institutions. If he might offer one slight word of criticism, it would be in regard to Professor Roger Smith's statement as to the engineering laboratories established at University College being the first ever established in this country. There was a distinguished professor of engineering at University College, he believed, from 1847 to 1855, Professor Evan Hodgkinson, than whom no one had done more for the establishment of experimental data in connexion with engineering. Professor Hodgkinson made his experiments at Manchester, and he (the speaker) succeeded, in 1855, to the use and care of the Professor's instruments, and for ten years after that specimens of iron, steel, timber, and stone came from various parts of the country to be tested. The special merit of University College was that it had opened a laboratory in connexion with an engineering school, and this was a very meritorious achievement. It was almost a defect nowadays that the laboratories were taking too much of an identical form; and it would be preferable if, in different laboratories, certain directions of work were a little more specialised. In the arrangements of the equipment of the school at University College, he thought the workshop took rather too subordinate a place. Experience had shown him that the workshop was a very important part of any modern engineering school, and in giving expression to that view he believed he was in accord with the universal experience of America, where the schools were on the whole better equipped, and where the workshop took an important place in the college.

Mr. H. H. Statham remarked that this was an architectural society, and he hoped they would not separate without something being said from the architectural point of view. It appeared to be forgotten that the Professors of University College were in possession of a building by an eminent architect, which was one of the ornaments of London, and he had heard no reference whatever made to what was the original design of the building, or to the extent to which that design had been considered, except the one remark that the internal ordonnance of the quadrangle had been carried out. He did not believe Wilkins ever intended that such internal ordonnance should be carried round the front at all. He had challenged Sir Douglas Galton in the *Times* to produce any evidence of it, but none was forthcoming. There was, however, in the library of the Institute a small old-fashioned engraving, which was marked as "Design accepted by the Committee for University College," and, although it was a poor thing as architectural drawings now went, it was quite easy to see what Wilkins's intention was. The north and south wings were to be brought up to the street; they were to be connected by a low ambulatory of one story, and the fronts to the street were not to be treated with flat pilasters as in the design now exhibited; the front was to be broken, the centre part being brought out, and the upper portion to be a portico of four columns. It would be clear to every architect that Wilkins's idea was that these porticoes were to be a kind of echo or balance of the centre portico. He was not so bigoted as to say that, when the college wanted more room for their workshops, they were not to consider the matter; but he thought a little better attempt should have been made to carry out the feeling at least of Wilkins's design. At all events, they might have heard some reference made to that point, and some regret expressed at the apparent necessity of spoiling the work of an eminent architect, and of depriving that part of London, which had few attractions, of one of its finest objects and of an open space that could ill be spared. On the day when these laboratories were opened, Mr. Horsburgh, the secretary, told the reporters that it was a mistake to suppose the quadrangle would be enclosed, and that there would be a space of 100 ft. left in the centre. He would like to know from whom that statement first emanated? He had looked at the place, and a single glance showed him that there could not be half that space, but he had also had it measured, and he would like to draw the attention of the meeting to one or two figures. The length of the new wing, when completed, would be 213 ft.; and the length to the central axis of the site was 237 ft., leaving 24 ft. on each side of the centre, or 48 ft. for the magnificent opening shown in the perspective view exhibited. He wished, therefore, to know why the public were informed that there would be 100 ft. there? Then again, the circular

porticos on the plan, which was to be published with the Transactions, projected 21 ft. beyond the line of the main building; which would leave just 6 ft. between them. He would like to know, unless it was proved to the contrary, whether the Council intended to accept that perspective drawing as a representation of fact? He would also put forward the general proposition, that the building had been treated without sufficient regard to its original design, and that the design, as shown, was not such as could really be carried out.

Mr. Elsey Smith said that Mr. Statham had undoubtedly been led into error in his measurements, because he had assumed, as had frequently been done, that the centre of the two porches forming the entrance to the college was on the same centre line as the central portico. That was not the case, there being a difference of 10 ft. between the axis line of the portico and that of the present gateway.* There was not 100 ft. between the two, and it was never intended there should be, so that he could not understand how any such statement came to be made. At the same time, the drawings shown had been made by Mr. Brewer from actual plans. It was easy to see how Mr. Statham had made this error in the measurement of the front, for no one in looking at it from the street would believe that the axis of the present gateway was not on the axis of the central portico.

Mr. Statham said that the entrance gates were shown central with the axis on the large scale ordnance map, and it was easy to see when one was on the axis of the building by standing on the other side of Gower-street, and getting the position from which the cupola came symmetrically over the columns. He was certain it was not 10 ft. out of the axis, nor anything like it.

Mr. William Woodward remarked that questions of measurement were matters of fact, and could be easily settled. The front to Gower-street was a plain Classic one, and with a due regard, even to the smallest detail, of the original mouldings and design of Wilkins, therefore, as Professor Roger Smith had been commissioned to erect these buildings on a site which he could not enlarge, he had satisfactorily overcome the difficulty. There would only be in Gower-street what was to be seen in Oxford, so that they could go into the quadrangle and examine the objects there.

Professor Capper spoke of what was being done at King's College in the matter of engineering.

Mr. Forster Hayward was aware of the difficulty of working in the details of such a place with the architecture of the building. As an old schoolboy of University College, and as an architect, he was well acquainted with the place before any wings were added to it, and in all friendliness he was compelled to condole with Professor Roger Smith on having had put upon him the necessity of building out the delightful view from Gower-street of the portico dome and building of University College. They must all feel that whatever the exigencies of the case were it would be a great loss to cut off the view from what had evidently been designed to be seen from the street, because the wings were brought up and finished at the ends in the view of Wilkins's original design. The authorities of University College ought to have thought very closely of this before they took up the ground they had done. He would like to know whether it was really impossible to have got one or two of the houses at the back, where the old physical laboratories were at present, and to have added the series of new laboratories there, all connected with the theatres? He should have thought it would have been much better to do that than to bring the laboratories to the front, where there was considerable traffic. A quadrangle, to be worth anything, must be very much larger and deeper, and should have a wider entrance opening than what was now proposed. He hoped the matter would be reconsidered, and that they would not destroy a very important view of part of the architecture of London by carrying out the proposed plan.

Professor Carey Foster said he owed a debt of personal gratitude to Professor Roger Smith and Mr. Elsey Smith for the great trouble they had taken in endeavouring to meet his views in the plans of the physical department of the college. The result was that University College now possessed as good a physical laboratory as any similar institution in the country.

Professor Beare added his testimony as to the great debt of gratitude due to Professor Roger Smith and Mr. Elsey Smith, for the manner in which they had carried out the design, on the limited ground plan at their disposal. He had now been in the occupation of the block since October, and had found that it met all requirements, besides being remarkably free from noise. The vibration generally caused by machinery was prevented, by having the whole of the concrete flooring separated from the side walls, the space between being filled in with slag-wool or something of the kind. So well had this plan answered that, although the lecture-school was close above the dynamo, there was no noise at all from that source.

The President said it was extremely satisfactory to learn, on the authority of the learned Professor, who had made use of these buildings since their erection, that they answered admirably the purposes for which they were designed. The architectural question was, of course, one of the utmost interest to the profession, and the facts brought forward by Mr. Statham certainly appeared to be very circumstantial, he being a man who was little likely to make such statements without having satisfied himself as to their accuracy. At the same time, he could hardly think it credible that any architect of experience and repute would so set out additions to any important buildings as to produce the result that the buildings on either side of what was intended to be a wide central opening, should be within 6 ft. of touching each other. With respect to the façade, he should have liked, if the opening in question could possibly have been more of the proportions indicated, possibly in error, originally. At the same time, it was only fair to remember that the circumstances of the time when Wilkins designed the building were very different to those of the latter part of the nineteenth century, and had Wilkins known for a moment what the century would produce, he might have indicated a very different plan.

The vote of thanks was then put and carried.

Professor Roger Smith, in acknowledging the vote, said that one point on which he was rather strong was the question of the sloping floor. From experience he had proved that this was best for a lecture-theatre. He had designedly made this a technical paper. It had appeared to him that if the work he had to do had any claim to consideration, it was because scientific pursuits were assuming great proportions, and that he was able to furnish a certain amount of information, which would be useful to his colleagues, as to what was necessary in a well-equipped scientific laboratory. He had felt the responsibility of dealing with the architectural claims of University College, but he might be allowed to say that, when the undertaking was started, several members of the building committee, who were Oxford and Cambridge men, wished to enclose the quadrangle entirely. He was bound to say that he considered a building which was entirely a quadrangle had a dignity that a three-sided building did not possess, and he was not at all sure that University College would not have gained rather than lost, supposing that course had been pursued. At the same time, he had fought rather hard for the retention of the central opening, and what had been arranged was the result of a compromise. He would be only too glad if the gap were wider than was shown in the plan, and there would be no difficulty in finishing the building at the point where it now was.* But he entirely disclaimed that they had spoilt the building by shutting it in. No doubt, as viewed from Gower-street, the splendid portico and steps were better seen than they would be when the building was completed; but the demands for accommodation were imperious, and he believed that, at no distant time, it would be necessary to carry out practically what the drawings showed. Perhaps when Mr. Statham next went that way, he would be kind enough to stand before the two porches, and he would then find that the centre of the Hospital was not opposite him. The Hospital was, no doubt, set out truly opposite to University College, and it would be found that the central dorway of the Hospital did not face one when he stood between the two porches. (Mr. Statham—"I noticed that.") In conclusion he would say that he admired Mr. Statham for the interest he took in this building, which was one of the architectural bits of London. If Mr. Statham had been led to push his view rather more strongly than he (the speaker) would have liked, at the same time, he quite recognised that there were few men who had any zeal for architecture, or who were in the position Mr. Statham enjoyed, of being able to say a word in season which could be heard by the public with regard to architectural buildings. He quite recognised that duty often called upon Mr. Statham perhaps more than most people to be a jealous guardian of architecture, and he was well aware that the *Builder* had in countless instances done good service in that respect.

The President announced that the meeting on March 12 would be a special one, for the election of the Royal Gold Medallist for 1894, followed by a business meeting for the election of candidates as Fellows and Associates. It was proposed to devote the remainder of that evening to the consideration of the Bill now being promoted by the London County Council on the Streets and Buildings of London.

The proceedings then terminated.

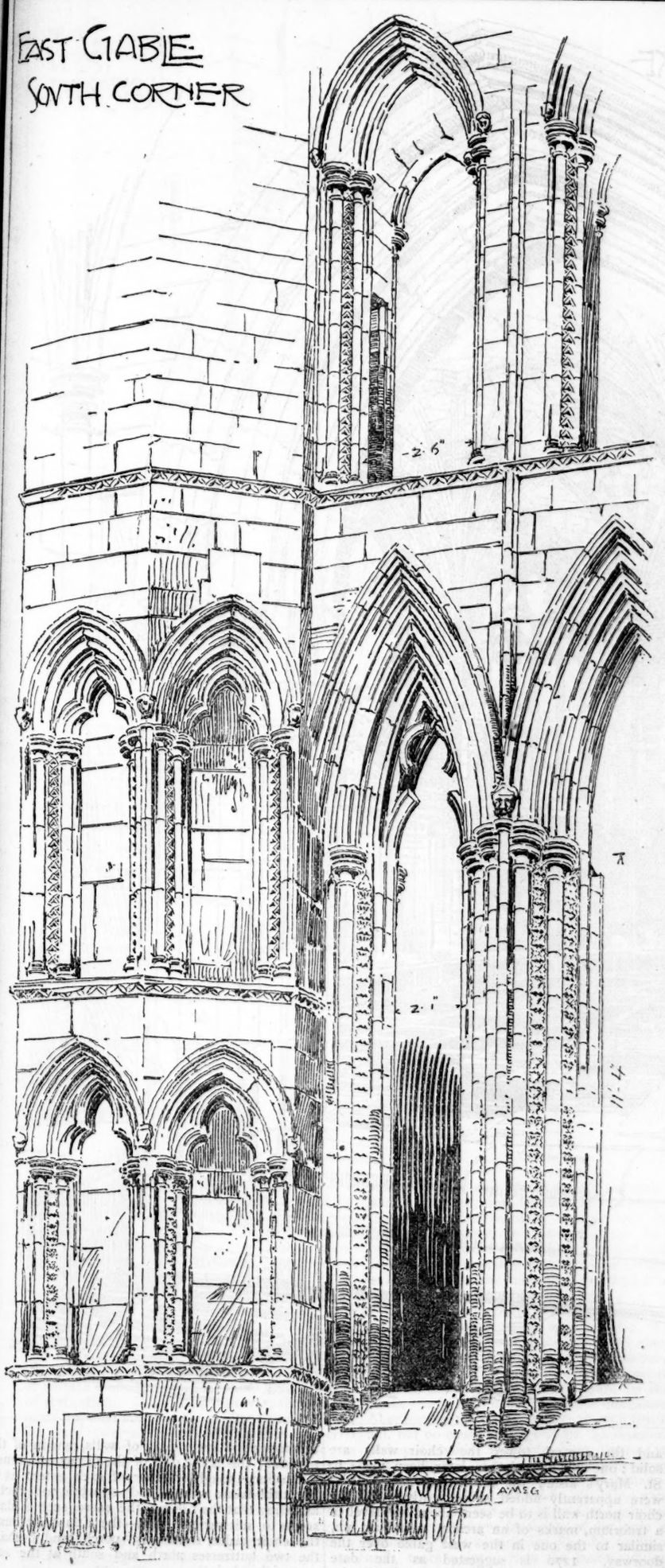
[As the correctness of my statement in regard to the alignment of the new buildings has been denied, I requested Professor Henry Adams to ascertain with a theodolite the point at which the axial line of the portico of the old buildings cuts the gateway in Gower-street, and the distance from that line to the break in the wall of the new buildings. I gave him no hint of my own measurements. The testimony of the theodolite is that the axial line of the portico cuts the gateway not 10 ft. to the north of its centre as Mr. Elsey Smith asserted at the meeting (an assertion the absurdity of which would be manifest at a mere glance at the place), but 7 in. to the north of it. As I had estimated by the eye that it was slightly south and not north of the centre of the gateway, Professor Adams's measurement from the axial line to the break in the new building is therefore naturally 1 ft. greater than mine; 62 ft. instead of 61 ft. It follows, therefore, that the block plan which I exhibited to the meeting, to show how much space would be left between the two new wings if they were built symmetrically in regard to the axial line of the portico and cupola, is substantially correct, the only difference being that there would be 8 ft. left between the semi-circular porches instead of 6 ft. As the perspective view published in the Journal of the Institute shows a double road-gateway with a pretty wide iron standard in the centre of the road, and room for two cabs to pass at each side, some idea of the extent of its inaccuracy may be formed. Professor Roger Smith is wrong about the Hospital doorway also, as he might have seen by merely standing in the centre of the hospital step and looking at the pediment and cupola opposite, when he would have seen that they were out of line from that point. Professor Adams finds that the axial line cuts the bottom step of the Hospital doorway 1 ft. 9 in. from its south end, which (as the step is 10 ft. long), makes the Hospital 3 ft. 3 in. out of line with the College. Professor Roger Smith will perhaps now perceive that he had better have known more about the alignment of his own building before professing to correct my mistakes. Even if he had been right in the assumption that the Hospital and the University were aligned on the same axis, that would not have given him the space he wants by a great deal, and his plan exhibited at the meeting would still have been incorrect—by how much I cannot say, as he has prudently abstained from publishing it in the Journal of the Institute. His own assumption on this head, I may add, was practically a direct contradiction of his son's statement made a few minutes before, that the line was 10 ft. to the north of the gateway centre. Mr. Elsey Smith has now, I find, altered this to 5 ft. He will have to alter it a good deal more. His statement seems to have been made on the same principle on which the other answers to my criticisms have been made on behalf of the University College authorities—those of the Secretary at the opening of the new rooms,* and those of Sir Douglas Galton in the *Times*, viz., to say something that suited their case, whether true or not, in the hope that people would believe it.

I now wait with some curiosity to see, first, whether Professor Roger Smith still means to maintain that his plan and his perspective view give a true representation of facts; and secondly, what apology a young man like Mr. Elsey Smith intends to make to me for having flatly contradicted me in the face of the meeting with a statement which turns out to be as untrue in fact as it was dictatorial in manner.—H. H. STATHAM.]

* Mr. Elsey Smith has asked us to state that since Monday he has referred to the drawing from recollection of which he spoke, and that he finds that the difference there shown between the axis line of the portico and that of the gateway is 5 ft., not 10 ft. as stated at the meeting.

* Professor Smith has asked us to add the following note to his remarks:—"Were the present building finished at the point which it has now reached, and a corresponding length given to the north block when built, the space between these blocks would approximate very closely to 100 ft., a circumstance which, no doubt, has led to that dimension being mentioned in connexion with the gap."

* I acquit Mr. Horsburgh of any intention to mislead; he no doubt, merely followed his instructions.



Illustrations.

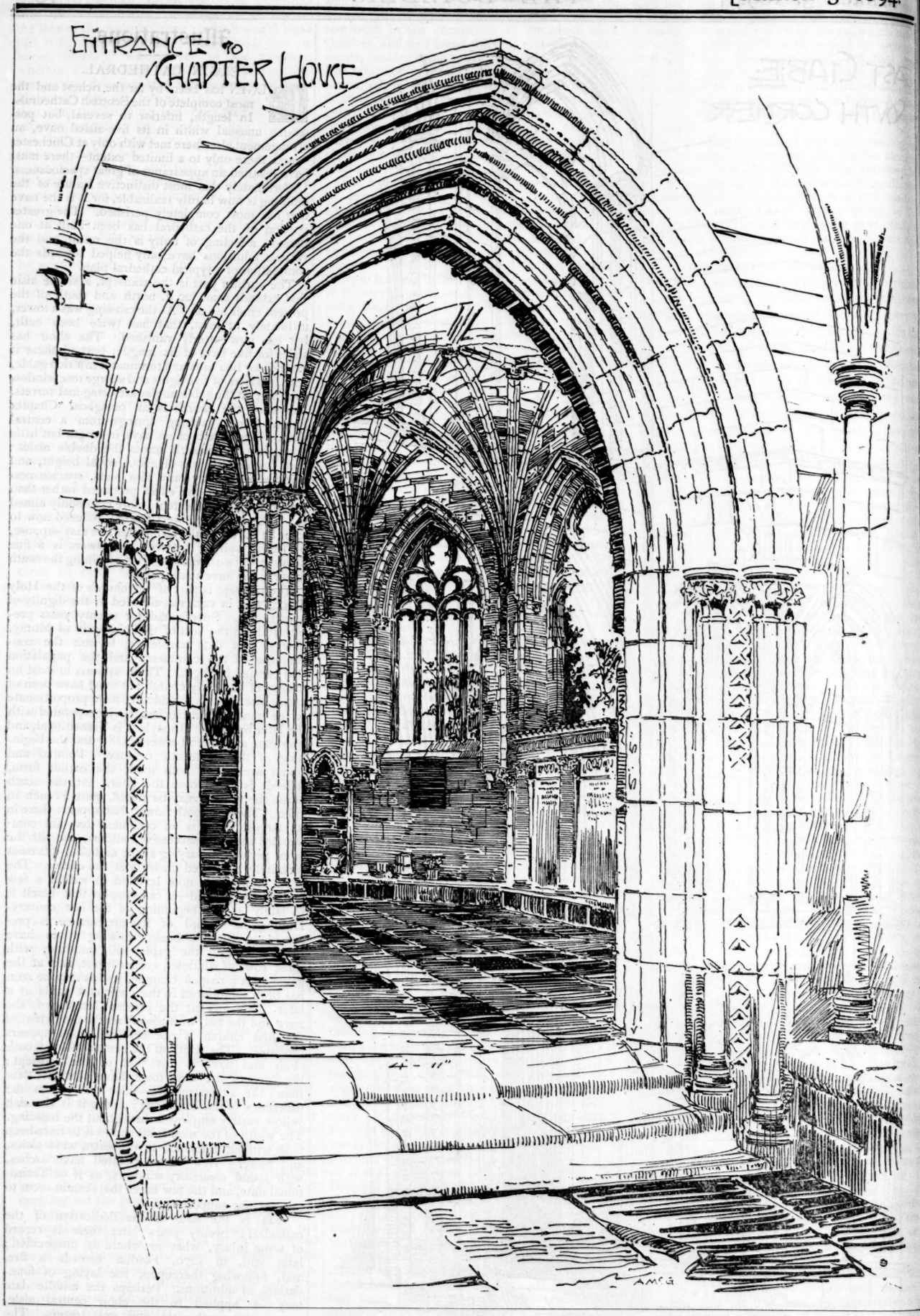
ELGIN CATHEDRAL.

ELGIN has been by far the richest and the most complete of the Scottish Cathedrals. In length, inferior to several, but possessing unusual width in its five-aisled nave, an arrangement elsewhere met with only at Chichester—and there only to a limited extent—there must have resulted an appearance of great spaciousness. Unfortunately this most distinctive feature of the building is now hardly realizable, for it is the nave that has most completely perished. The greater portion of the cathedral has been built at one period; a feeling of unity is the result, and the various additions have only helped towards the completion of a typical cathedral plan.

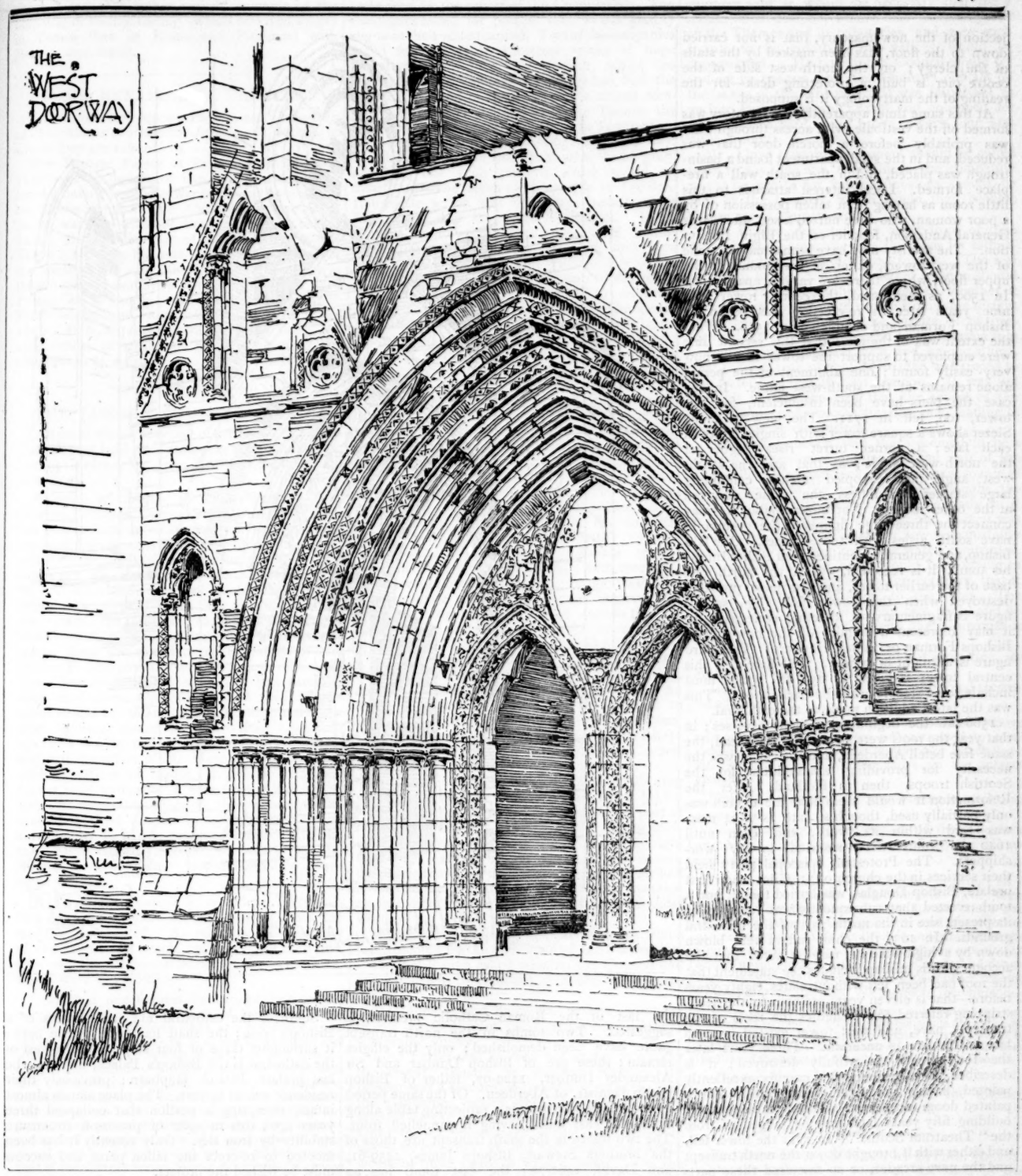
The earliest part is the transept, a single aisle that extends some 20 ft. north and south of the present choir aisles. At the crossing was a tower, ultimately at least, that has twice been built, but has now utterly vanished. The choir has aisles for five bays of its length; beyond these it extends for two bays and terminates in a rich gable, with two tiers of five lights and a large rose window over all; at the gable angles are octagonal turrets. North of the church is an octagonal Chapter House, whose vaulting springs from a central shaft. The nave is of six bays, in length but little exceeding the breadth across the double aisles; each double aisle was of about equal height, and being separated by only slim piers, spaciousness must have been the effect produced rather than that of long-drawn extent, more commonly aimed at. There are two west towers, reduced now to some 84 ft., originally terminated, we may suppose, by timber spires; between the towers is a fine doorway of two openings. Just adjoining the south tower is the nave south porch.

The transept is part of the church of the Holy Trinity that in 1224 was elevated to the dignity of a cathedral. Spynie had for twenty years previously been the seat of the bishopric of Moray, now at this date transferred to suit the convenience of the commerce and the population that centred in Elgin. There appears to exist no history of the early church; it must have been of ample size if its choir and nave were proportionate to the transept that has become incorporated with the later building. In style it is Transitional, and may date anywhere between 1180 and the beginning of the thirteenth century. Pointed and round arches are both used, the earlier form, indeed, is found over the later. At the south porch the scallop may be noted, quite French in effect. The dog-tooth flower that appears there in its largest form, is an ornament that has commended itself to successive builders, for till the latest period, in varying shape and size, it is most plentifully displayed throughout the edifice. The north transept is now levelled to within a few feet of the ground—a catastrophe that befell it so lately as the beginning of the last century. Happily, a record of its appearance is preserved in Slezer's book, showing it to have been similar to the gable still standing, with three rows of windows, corner turret, and at the gable apex a cusped triangle, just as may be seen has been reproduced in the choir east gable at a later date. That the present length of the nave and the two west towers marks the extent of the first church is not certain, but it appears probable. The width of the central aisle of both choir and nave is just that of the transept; the base of the west tower looks of earlier date than the superstructure—this apart from the difference in the sandstone; above it is the rich yellow variety employed throughout the building. The width of the west front shows it to have been built without reference to the extra wide aisles, and Slezer's view shows pointed nave arches, with round clearstory windows, as if of Transitional date, and the few bases that remain seem to support the supposition.

1224 is the date of the dedication of the cathedral; twenty years later there is record of some injury, what or where is unspecified; later still, in 1270, Fordun records a fire, and, following thereupon, the laying of foundations of additions. Perhaps the middle date may be applied to the choir central aisle, nave, outer south aisle, and west towers. The three bays of that aisle east of the south-west tower are plainly of the same date as the choir gable, so we must infer that the double aisles from the first had been intended by the cathedral builders, though almost certainly the first church had but single aisles, lining with those of the choir, and so abutting properly within the spread of the two west towers. The rich "skew" of one of the gables of these south aisle chapels is notable;



it is, however, of later date. In the choir a peculiar feature is to be noted; midway are the responds of what has apparently been intended for an arch to mark the junction of the choir with a Lady Chapel or a Presbytery, but the intention has been departed from, and above the capital the projection works back to the line of wall by a series of crocketted pinnacles. Between these responds and the central tower the choir walls are solid; one opening only has, later, been made to St. Mary's aisle; the north and south aisles were apparently added subsequently. In the choir north wall is to be seen, about the level of a triforium, marks of an arcade, now built up, similar to the one in the west gable over the doorway. 1270 is suggested as the date applicable to the Chapter House, though only the buttresses and lower part of walls remain of the original; this is the date of the fire as mentioned in Fordun, though whether of such extent as to affect the fabric is not stated; so while not exactly assuming that the fire was the cause, such a date seems to suit various parts—the Chapter House, the choir aisles, south-west porch, and perhaps the two buttresses north and south at the east part of the choir.



In 1390 occurred the burning by the Wolf of Badenoch, an Earl of Buchan and son of the king, Robert II. Little better than a robber chief, various offences against the Church dignitaries led to his excommunication by Bishop Barr; the raid was in retaliation, and much more than the cathedral was involved; St. Giles' Church, the Maison Dieu, and eighteen manses of the canons and chaplains were burned. The sacrilege excited great horror, the bishop appealed to the king, and the ravager had to submit to public penance in the church of the Blackfriars, Perth, and thereafter by donation of certain lands and of gold, make some measure of restitution. Obviously, however, the punishment imposed failed of terrorising like evil-doers, for only twelve years later another powerful chief, also presuming on high birth—for he was son of the Lord of the Isles—fell on the church and plundered it. The attack, we may believe, would be directed against removable valuables, so his raid may have left the building untouched. That of the Wolf was one of revengeful destruction, and must have damaged the building seriously, though to what extent positively is not known. The Chapter House seems to have suffered most, and would appear to have been almost wrecked, from the fact that seventy years later restoration required a complete interior casing of masonry, and new windows; the three outer south aisles of nave west of the transept and the west doorway seem all to have suffered—at least, these parts have been renewed at a date clearly subsequent to the burning.

During the episcopate of Bishop Spynie, 1397-1406, the central tower was begun; it may either be that he completed what till then had been unfinished, or that from the foundation, new piers were built. There are other notices of the progress of this work, carried forward by Bishops Innes and Lichtoun, the latter translated to Aberdeen in 1414. However, in 1506 this tower fell, but no cause is assigned for the disaster. In Bishop Columba Dunbar's time, 1422-1435, the west gable had its present large window inserted; as suggested, it may be because of damage done to what had existed previously, doubtless windows in tiers as at the east-end, but perhaps only because of the current vogue in favour of the large single window. This window is noticeable for its acute arch, more pointed than the lancet, unusual in work so late. At the same time the rich interfilling of the doorway under seems to have been added. It is a double opening with a vesica panel between, in front of which was a figure, now removed. At the same time the two west responds of nave arcades have been restored, and the decline in grace of moulded profile is seen in the bell of the capitals there, a sharp angle without undercutting taking the place of the usual curve.

On the wall of south tower, facing the nave, are the remains of plastering, and as adjoining fine ashlar work it may be presumed painted decoration was intended.

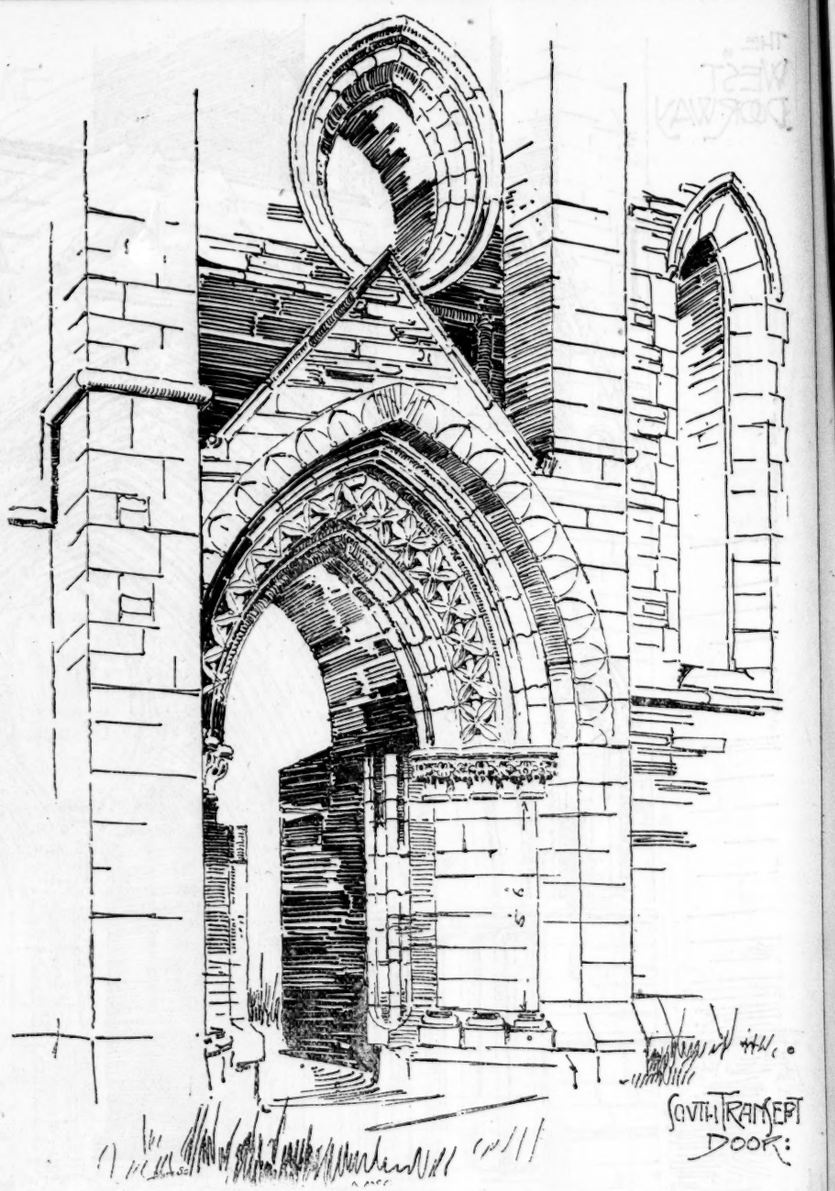
In 1462 the Chapter House was restored, and dedicated to the Passion, by Bishop David Stewart. A shell of interior masonry was built and new windows inserted; all the tracery has gone now; one was restored some thirty years ago. The south wall alone has not been veneered, and it shows, over the doorway, a row of four arched recesses, once occupied, it is said, by figures of the Evangelists. The centre pier and the vaulting springing from it is graceful, but the carving throughout is indifferent. At the north wall is the dean's raised seat, above is an arcade, omitted on the other sides of the octagon, as if the pro-

jection of the new masonry, that is not carried down to the floor, has been masked by the stalls of the clergy; on the north-west side of the centre pier is built a projecting desk—for the reading of the martyrology it is supposed.

At this same time, apparently, the Lavatory was formed off the vestibule, with access through what was probably before a porch door that was reduced, and in the small apartment found a basin-trough was placed, and in the south wall a fire-place formed. Local interest attaches to this little room as having been taken possession of by a poor woman, who here nursed a son, afterwards General Anderson, founder of the Elgin Institution. The sacristy may have been situated in one of the west towers, either on the ground or the upper floor, where there are various apartments. In 1506, as mentioned, the central tower fell; nine years later its re-erection was begun by Bishop Forman and completed in 1538. What the extent was of the piers that this second time were employed to support the tower is not now very easily found; one abutment of the period alone remains at the south-west angle. In any case the piers have been insufficient, for this tower, too, fell in 1711. The view given by Slezer shows a square tower with single lights in each face; a corner turret rises higher at the north-west angle; at that and the south-west angle are canopied niches containing large statues; doubtless the same occurred at the other angles. Not unreasonably we may connect the three large figures on the ground in nave south aisles with these niches. One is a bishop, and generally identified with BishopInnes; his tomb, it is recorded, was at the north-west base of the earlier tower, and was most probably destroyed when that tower fell. The second figure is fragmentary—a kneeling ecclesiastic, so it may represent a founder of the new tower, Bishops Forman or James Hepburn. The third figure is a knight in armour. The height of this central tower is given as 198 ft., which must include some steeple or saddle-backed roof. This was the latest addition made to the cathedral.

1568 saw the beginning of many reverses; in that year the roofs were stripped of their lead, the same fate befell Aberdeen, and the cause was the necessity for providing ammunition for the Scottish troops, then in Holland. After the Reformation it would seem that the church was only partially used, though so late as 1594 mass was said within its walls, and even until 1640 its ruins were resorted to by worshippers. The Protestant episcopal party held their services in the church of St. Giles; their first prelate, Bishop Douglas, was buried there; and a tomb erected that subsequently was removed to its present site in the north part of the cathedral grounds. In 1637 the choir rafters were blown down by a high wind: it may be noted that the account of this mishap includes the statement that the roof had been left without slates eighty years before—that is eleven years previous to the lead-stripping referred to. Whether the roofs of the transepts, nave, and west tower existed even so late as this date is uncertain. Three years later the rood-screen was wilfully destroyed; it is described as of timber, with crucifix excellently painted, having gold stars facing west, and a painted doom facing east. The appearance of the building fifty years later may be judged of from the "Theatrum Scotiæ." In 1711 the tower fell, and either with it brought down the north transept and the nave arcades, or so fractured these parts that their collapse was not long averted. The mass of ruins, however, was not suffered to encumber the ground long, being gladly seized upon by all requiring building material. The Crown authorities were the custodians of the edifice, but they were quite indifferent to its protection, all honours in that direction going to a sexton, one John Shanks, whose memorial is that for many years he devoted himself single-handed to the clearing away of all rubbish, while preserving all of carved and moulded work. After his time the ruins have been and are well cared for by the Commissioners of Woods and Forests.

There are various monuments of interest in the church. The earliest is a wall-tomb on the north side of the choir; the opening is on the ground level, under a cusped arch that is enclosed within a gable. Strangely enough, for whom the tomb was intended is not positively known. Bishops Barr or Spynie are suggested, as both were buried in the choir, though their dates are later than quite suits the tomb. A similar, but plainer, wall-recess is in Kirkwall Cathedral nave. The adjoining canopied tomb, that fills up the arch between choir and north aisle, also wants identification; Bishop Patrick Hepburn, d. 1573,



the last of the Roman Catholic prelates, is suggested. Two tombs in the north transept gable have been demolished; only the effigies remain; these are of Bishop Dunbar and Sir Alexander Dunbar, 1429-97, father of Bishop Gavin Dunbar, of Aberdeen. Of the same period as the tombs destroyed is a projecting table along north and east walls, having a pannelled front. The two tombs in the south transept are those of the brothers Stewart, Bishops James, 1459-61, and David, 1462-76; the east tomb has an almost flat top, the adjoining one an ogival head. Other wall tombs are; of Bishop Winchester, 1437-58, and Sub-Dean Lyell, the first showing traces of decoration on its arch-soffit; and there are two tombs of sarcophagus type, to William de la Hay, d. 1421, and to the first Earl of Huntly, d. 1470; all these four monuments are in the choir south aisle, called St. Mary's. In the Chapter House are one or two seventeenth-century classic monuments that do not call for remark. The sedilia is unfortunately almost obliterated; it is under a window that, in consequence, has its sill raised a couple of feet; it had four bays or canopies, and flat pinnacles at each end. In the choir is set up a fragment of a Celtic cross discovered in 1823 in the town; it is part of the shaft, 2½ ft. wide, and 1 ft. thick. In the nave is a stone coffin built into the south wall, traditionally believed to have contained the body of King Duncan, wounded in battle by Macbeth, before removal to Iona, in 1046. In the choir is a large slab that has been covered with brass in the same way as a similar one in St. Andrews Cathedral; here also the metal is removed; it is generally supposed to mark the grave of Bishop Moray, 1223-42, but it may belong to a later date.

South of the cathedral are the remains of a Bishop's cross; the shaft has gone by the base; it surmounts three or four steps. North-west of the cathedral is the Bishop's Palace, built by the last prelate, Patrick Hepburn: previously their residence was at Spynie. The place stands almost intact, excepting a portion that collapsed three years ago; this in spite of provision to ensure stability by iron ties. Only recently it has been mooted to re-erect the fallen parts, and success must be wished the project.

In the Chapter House are preserved all fragments of carved work found. Some of the capitals of the pier that divided the double aisles are particularly well cut, and have quite the best foliage to be met with in the building. The capitals about the choir are all moulded, carving being confined to the label stops—all heads—the dog-tooth flower in many varieties, and in enriched strings. In the nave, south aisle, are some excellently-carved corbels; at the west door may be compared two periods of carving.

Shaw's "History of the Province of Moray," published about the middle of last century, but amended in a more recent edition, is the chief authority on the subject.

VENDRAMINI PALACE.

THIS view of one of the finest of the Venetian palaces is published as an illustration to Professor Aitchison's Fifth Royal Academy Lecture, given on another page. Well known as the Vendramini Palace is, we are glad to have an excuse for including a view of it in our pages, where it has not been illustrated, at all events, for many years back.

It belongs to the period of about 1600 or thereabouts, and is a rather curious example of the blending of Gothic feeling (which survived longer in Venice than in Rome and Florence) with Renaissance detail.

SOME RENAISSANCE PALACES.

THESE four well-known Palaces are also given as illustrations to Professor Aitchison's lecture, in which they are referred to.

The Farnese Palace at Rome was built about 1530 from the designs of San Gallo, the courtyard facades having been afterwards somewhat modified by Michelangelo. The Cancellaria Palace at Rome was the work of Bramante; the Rucellai Palace at Florence that of Alberti, about 1460. There is a family likeness between these two in the method of using the pilasters, which gives them a certain similarity of character. The Pitti Palace at Florence has been attributed to Brunelleschi, and was built somewhere about 1440. It is imposing from its great scale and massiveness of treatment rather than from any elaboration of detail.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Mr. John Hutton, the Chairman, presiding.

Salaries of Heads of Departments. — The General Purposes Committee reported that they had before them applications from the following heads of departments for a reconsideration of their salaries—viz., Mr. A. R. Binnie, the chief engineer; Mr. T. Blashill, the architect; Mr. W. A. Blaxland, the solicitor; Mr. W. J. Dibdin, the chemist; and Mr. Andrew Young, the valuer. In addition to these, the Public Health and Housing Committee had brought before them the question of the salary of Mr. Shirley F. Murphy, the medical officer of health. The Committee added that they had carefully considered these applications, and they recommended that the salary of Mr. A. R. Binnie, the chief engineer, should be raised from 1,500*l.* to 2,000*l.* a year by two annual increments of 250*l.*; and that the salary of Mr. Murphy, the Council's medical officer of health, should be increased from 1,000*l.* to 1,250*l.* a year from April 1. A long discussion took place on these recommendations, but it was ultimately agreed, after several amendments had been proposed and lost, to grant the recommended increase of salary to Mr. Binnie. The other recommendation was negatived.

Policy of the Council as to Water Supply.—The adjourned report of the Water Committee was then considered. As we gave the substance of the report last week, page 157, we need now give only the recommendations of the Committee, which were as follows:—

"(*a*) That negotiations be entered into for the purchase of the undertakings of the water companies, or one or more of them, at a fair and reasonable price, on the basis of a desire to purchase and willingness to sell; having regard to any circumstances and statutory provisions affecting the present and prospective position, income, expenditure, liabilities, obligations, and value of the companies respectively and their undertakings, including any present and probable future demands for improvements and extensions of works, and new or additional sources of supply, and on the understanding that if satisfactory terms cannot be mutually agreed upon an application will be made to Parliament to determine in what manner and on what conditions a transfer to the Council shall be arranged.

(*b*) That the Water Committee be authorised to negotiate on the above lines, and to prepare details of the basis of arrangements."

Mr. Hopkins, the Chairman of the Committee, in submitting the report, said that there was no time to lose, as their hands had been forced by the march of events. Some of the conclusions of the Royal Commission were surprising. The Commission had found that, without going outside the Metropolitan area, it was possible to obtain water sufficient for the Metropolis in 1931. The water companies had put upon that finding a construction that it would not bear. The Commission had reported that as a physical fact that quantity of water could be obtained within the Metropolitan area, but it was not to be inferred that they would be justified in taking it. As a matter of fact, the Commission had been careful to avoid any assertion on the question of policy. After the issue of the report, they found themselves confronted by three formidable Bills promoted by three water companies. These Bills professed to be backed by the report of the Commission. The companies asked for powers that would greatly augment their vested capital. Two of the companies asked for powers to construct works of huge magnitude and great permanence, while the Southwark and Vauxhall Company had had the boldness to ask, in the name of the united companies, for power to take from the Thames the whole of the water running down to Teddington, with the exception of 200,000,000 gals. a day. He did not believe that Parliament would grant anything like such powers, which would be disastrous to the hopes of the people of London. Immediate action was necessary, because those Bills would soon be before Parliament. If the Council could show that they were willing and able to undertake, on fair and just terms, and to carry on the water supply of the Metropolis, all pretext for addition to the vested interests of the companies would be removed. It was contemplated by the Royal Commission that there should be taken from the Thames 300,000,000 gallons, from the Lea 52,500,000, and from springs and wells 67,500,000 gallons, making an additional volume of 420,000,000 gallons per day. He would not criticise those figures, though it was believed in influential quarters that their adoption would be attended with extreme peril to London. The scheme depended upon nine large reservoirs being made in the neighbourhood of Staines, and he would only say that the practicability of making those reservoirs was seriously doubted by eminent engineering and geological authorities. One aspect of the question—namely, the financial aspect, had not been dealt with by the Commission. The general estimate of the companies was 9,702,675*l.*, which, with inevitable extras, would come out at about 10,000,000*l.* Mr. Binnie, whose authority as a water engineer was second to none, was distinctly of opinion that the cost of those reservoirs would not be much less than double the sum mentioned by the promoters. The scheme contemplated the employment of a thorough system for the prevention of pollution, and that would require the employment of an army of inspectors. He urged the Council to adopt the recommendations of the Committee, embodying as they did the first of a series of steps which it was of great importance that the Council should take.

Mr. Saunders, M.P., moved that the following words be added to the recommendation (*a*):—"Provided that no monopoly right on the part of the water companies be recognised." If, he said, the water companies possessed a monopoly right they could only be bought out at enormous cost. Of course they had no such monopoly right, and it was merely to guard against any misconception on that point that he moved the addition of those words.

Mr. Harvey seconded the amendment, which was accepted by the Chairman of the Committee.

Colonel Rotten asked whether the Council had any legal right to compete with the water companies.

Mr. Hopkins said there was nothing whatever in the law to prevent the Council establishing a competing supply.

Lord Farrer said he was not going to oppose the report, though he doubted whether the present was a favourable time for negotiating with the companies, which were just now elated on account of the finding of the Royal Commission. Until the Commissioners' report was pulled to pieces by criticism, he did not think the public would be quite aware of what it meant. On the other hand he recognised that there were reasons for approaching the companies with terms of purchase, which would place the Council in a better position to oppose their scheme. He suspected that the negotiations would be useless. He desired to indicate certain precautions which he thought the Council should take. It was desirable for it to enter the contest with as many allies as possible. On a former occasion they were in alliance with the Corporation of the City of London, but perhaps it would not be so easy to secure the co-operation of the City after the publication of the report of the Special Committee on London government. West Ham and the other districts outside the county had shown themselves to be very interested in the question, and he thought it would be well also to secure them as allies. Then there was the question of the Council's relation with the Thames Valley districts. The suggested scheme, which involved the employment of an army of inspectors, would mean that every house and garden on the banks of the river would be liable to invasion and inspection at any moment, and that would bring the occupiers up in arms and in open rebellion. The engineer said it would be necessary that there should be no cesspool within four hundred yards of the Thames and its tributaries, and were such a rule to be enforced the valleys would be depopulated. He hoped the Council would try and act in concert with the County Councils on the banks of the Thames. It was important to go into Parliament well armed and equipped for what he was sure would prove a very long and difficult fight.

Mr. Lloyd thought Parliament should be called upon to say that any expenditure the companies might be put to for future extensions should be met by the Council, which would then become the owner of the new works.

Dr. Collins deplored the short limit of time taken by the Commission as the basis for estimating the future needs of the metropolis. The real question, he thought, was whether London should continue to drink purified sewage or whether it should seek an adequate supply from some distant watershed, which would be secure from contamination. The Commission had not taken into account many significant facts, and, among others, that the outbreak of cholera in 1866 was traced to the water supplied in East London. It was not difficult to take the view that the report of the Commission was a procrastinating one, leading to no satisfactory conclusions.

Sir John Lubbock said there seemed to be a general consensus of opinion on the part of the Councillors who had spoken that a new source of supply ought to be secured. He thought the Council had quite as much work already as it could satisfactorily get through, and that it was undesirable for it to assume a new responsibility and burden by taking over the water companies. It was said that the result would be a saving in the rates. He believed, on the contrary, that it would involve an addition to the rates. The Council ought not to break its own back, and he thought that in negotiating with the companies it would be making a mistake.

The recommendations of the Committee, as amended, were agreed to.

Lord Monkswell moved as an additional recommendation:—

"That, while carrying on the negotiations above referred to, the Committee be instructed to communicate with the various authorities affected or interested, to ascertain their views on the subject generally."

This was seconded by Mr. Torrance, and also agreed to.

New Buildings.—The report of the Theatres and Music Halls Committee contained the following paragraph:—

"We occasionally find that after drawings for a new place of public entertainment have been approved by the Council, no further steps are apparently taken by the applicant, and the premises are not erected. This we think is undesirable, as the Council is not perhaps cognizant of the position of affairs until a further application is made and drawings are submitted in connexion with another scheme for building on the site. We therefore recommend—

'That in future when drawings with respect to new premises to be used for public entertainments are approved by the Council, it be upon condition that the works in connexion therewith be commenced within six months from the date of the approval of such drawings by the Council.'"

The recommendation was agreed to.

After transacting other business the Council adjourned at half-past seven o'clock.

PROPOSED LOCAL MUSEUM AT EPPING FOREST.—On the 24th ult. a meeting, convened by the Essex Field Club in furtherance of the proposed Epping Forest Free Local Museum, was held in the banqueting-room, Queen Elizabeth Lodge, Chingford. Professor Meldola explained the aims and objects of the scheme, which were that a free local museum to illustrate the natural history, history, archæology, &c., of the district would be a suitable addition to the many attractions the neighbourhood of Epping Forest now possessed. The Queen Elizabeth's Lodge at Chingford, having been carefully preserved by the Conservators under the Act of Parliament as an object of antiquarian interest, was admirably fitted for the purposes of a local collection of the kind proposed. The council of the Essex Field Club would be willing to undertake the gathering together of specimens, and the curatorship and scientific superintendence of collections as a branch of the central museum. Before any steps for the actual formation of the museum can be taken the sanction and co-operation of the Epping Forest Committee will be necessary. It is estimated that 300*l.* would be required for the necessary museum appliances, but a sum of from 150*l.* to 200*l.* would justify them making a start. A resolution in favour of the scheme was carried, and a subscription-list opened.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION:

ANNUAL GENERAL MEETING.

THE twenty-seventh annual general meeting of the donors and subscribers of this Institution was held on the 27th ult. at the offices of the Institution, 21, New Bridge-street, E.C., Mr, William Shepherd in the chair, supported by Mr. E. Brooks (Treasurer), and by Messrs. E. C. Roe, W. Seymour, J. A. Robson, C. K. Turpin, F. S. Oldham, H. W. Parker, A. Stansfeld, H. T. Desch, O. Newling, W. D. Gilbert, and other gentlemen.

The report stated that the income for the past year had amounted to £674 16s. 9d., of which sum £257 4s. 6d. consisted of annual subscriptions, £299 0s. 0d. in donations, £116 17s. 4d. in dividends, and £1 14s. 11d. interest on deposit account. The total expenditure was £458 13s. 6d. of which 335l. was paid for pensions, and 25l. in various grants for temporary relief. Two elections were held during the year, Mrs. Martha Marcham being elected at the first and Mrs. Louisa Clark at the second. Two pensioners had died during the year, viz., Mrs. S. A. Coulson and Mrs. L. R. Styles. The number of pensioners now on the books is 17; the total number elected since the foundation being 37. Referring to the Orphan Fund, the committee reported that the Institution had now two vacant presentations to the Orphan Working School, and the committee were prepared to receive applications on behalf of builders' clerks' orphans, whose friends may wish to nominate them for election. The fifteenth annual dinner was held on the 18th of April last at the Cannon-street Hotel, Mr. W. A. Colls occupying the chair. The result was highly gratifying alike to him and to the committee, the sum of 320l. having been announced in aid of the funds. The committee had the painful duty of recording the death of the President (Mr. W. A. Colls) which occurred in October last, and which was the first instance, since the Institution was established, of its loss of a President by death during his year of office. By the untimely death of this gentleman the committee feel that they have lost a personal friend, and the Institution one who took an earnest interest in its welfare. Mr. Colin G. Patrick kindly completed the year of office broken by Mr. Colls' death. Mr. William Shepherd had favoured the committee by consenting to act as President for the present year. The committee announced a further purchase of stock, bringing up the total of invested funds to 4,550l. The report concluded by thanking the donors and subscribers for the assistance rendered.

The President Elect (Mr. Wm. Shepherd), in moving the adoption of the Report, said that it seemed to him that the Institution was deserving of support; those who composed it, in looking to the future, could not be expected by reason of their position to seek help of a legislative character which, perhaps, would not be thought at all derogatory in some other cases. It certainly seemed to him that it was a duty to make, in some way, provision in the event of need arising, and that it was, therefore, the duty of everyone of them as far as possible to help in maintaining such an institution as this—a duty to assist in the matter, and band together for mutual benefit. The number of builders' clerks at present supporting it was not so great as he should like to see. The Institution was a good one, and he could not see why more clerks did not belong to it. Mr. Shepherd concluded by moving "That the report, &c., be adopted and circulated amongst the subscribers."

Mr. W. D. Gilbert seconded the motion, which was put and carried unanimously.

A resolution was then proposed by Mr. E. Brooks and seconded by Mr. C. K. Turpin, thanking Mr. Colin G. Patrick (who had kindly completed the year of office unhappily broken by Mr. W. Colls' death) and the other retiring officers for their past services, which was also unanimously adopted.

On the motion of Mr. E. C. Roe, seconded by Mr. F. L. Oldham, the following gentlemen were elected officers for the ensuing year: viz., Mr. Wm. Shepherd, as President; Mr. John Burton, as Vice-President; Messrs. S. J. Thacker, T. Stirling, and Ernest S. Rider, as auditors. While a number of gentlemen whose term of office had expired by rotation were again elected as members of committee, and in addition Mr. H. T. Desch (Messrs. Cubitt & Co.) and Mr. O. Newling (Messrs. Colls & Sons) were elected members for the first time.

ARCHITECTURAL SOCIETIES.

CARDIFF ARCHITECTS' SOCIETY. — At the Lecture-hall of the South Wales Institute of Engineers, Cardiff, on the 21st ult., Mr. Edwin Seward, F.R.I.B.A., delivered a Presidential address to the members of the Cardiff Architects' Society. Mr. Seward dwelt upon the architectural growth of the principal European cities, and gave an outline of what the future of Cardiff should be. After alluding to the fact that members of provincial centres might now share with Fellows and Associates many of the advantages of the Royal Institute of British Architects, Mr. Seward stated that, under the new alliance the younger members and students from South Wales could sit for their periodical examinations in connexion with the Cardiff Centre. Proceeding, Mr. Seward said:—These benefits have for some years been shared in larger towns, as Manchester, Liverpool, Sheffield, &c., but in Cardiff they may be said to still lie before us. If Cardiff will show as much activity and enterprise in the art of true architecture as in the art of building, it may well be hoped that in a few years we may feel there has been but little lost time, and our town may yet compare with, at any rate, commercial cities like some of those I have named. . . . When I was asked to deliver a first Presidential address to this Society, I thought at once of some of the grand works of the old architects which it is a true delight to think and talk about. But we live in too progressive an age to linger overmuch on the past, and, again, we must not act so entirely in the living present that we have not leisure to attempt a discerning of the future. It seemed evident, therefore, that the subject matter of this address should be one that will allow us to glance back, to look around, and to gaze forward. In doing this, I want, if possible, to adorn my tale with art pictures of beauty from far and near, and to point my moral here in Cardiff—in Cardiff as it was and as it, perhaps, might be. I also desire to make suggestions illustrating the desirability of entering upon the consideration of a comprehensive scheme which may of itself open up, not one site for public buildings, municipal and otherwise, but, more probably, one dozen such sites. To my brother architects I would say that few objects could be found more likely to conduce to the honour and benefit of our profession than this, and few subjects could be more attractive to us as loyal townsmen. Mr. Seward proceeded to explain a large number of views of fortified and other towns and buildings in the different countries of Europe, demonstrating the architectural magnificence of the past two or three centuries, and said that municipal authorities in the Middle Ages, although, perhaps, not educated, had a high appreciation of the beautiful in architecture. Mr. Seward also urged the desirability of paying due regard to the question of open spaces in our principal towns. He also unfolded a scheme embodying the considerable re-modification of the town of Cardiff upon lines already suggested, to some extent, by the municipal authorities. The meeting closed with a cordial vote of thanks to the President for his address.

GLASGOW ARCHITECTURAL ASSOCIATION.—On the 17th ult. a lecture was delivered in the rooms, 114, West Campbell-street, by Mr. George Walton, the subject being "Interior Decoration." In the course of his address the lecturer urged that simplicity and not elaboration should govern the work, and ornament, if used at all, should be used sparingly, and should be very fine and well adapted for its position. Pictures have their decorative value, and this has perhaps been overlooked by the artists of to-day, who, in the opinion of the lecturer, might act a little more in unison with the architect in creating work for permanent positions. In the decoration of an ordinary commonplace house, the aim should be to get rid of the ugly portions, having them replaced by suitable decorations of an artistic value. The treatment of ceilings, walls, and floors was dealt with at length by the lecturer, who described various methods of producing good results by the harmonious employment of the materials.

A PARISH CHURCH LIGHTED BY ELECTRICITY.—The Parish Church of Leamington has been lighted by electricity. From the central dome depends a 24-light electrolier, and an ornamental 10-light pendant is fixed to the roof of the sanctuary. The nave, transept, side aisles, and choir-stalls are lighted by incandescent lamps attached to brackets on the caps of the pillars. Altogether there are 188 lights, 120 being of 16-candle power each, and the remainder 25-candle power each. The current will be supplied by the Midland Electric Supply Company.

ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—On the 21st ult., at a meeting of the British Archæological Association, Mr. Allan Wyon in the chair, the Rev. H. T. Owen gave a description of the excavations which he has had effected at Valle Crucis Abbey, Llangollen. The entire ground plan of the Cloister Court has been laid open for observation, the remains being extensive. Mr. Frank Williams reported the uncovering of a long length of the Roman Wall of Chester, at the Roodeye, during some building operations; also some discoveries in Watergate-street. Mr. Matthews Jones, City Surveyor of Chester, gave particulars of some other discoveries in Watergate-street, where a portion of a Roman villa has been found, and carefully preserved for inspection. Mr. Oliver sent a rubbing from a brass at Lynn, in which the old custom of "Riding the Stang" is represented beneath the effigy of the deceased, who is commemorated on the brass. Mr. Bodger exhibited a fine collection of Roman coins found near Castor, Northants, some having Greek inscriptions. Mr. Loftus Brock described some Roman coins found at Springhead, Gravesend, on which Christian emblems were represented. They were of emperors later than the time of Constantine. He exhibited also a coin of Crispus. On the reverse, the emperor held a standard in each hand, both standards having the monogram of Christ. The Chairman exhibited a silver Communion cup, belonging to St. Stithian Church, Cornwall. There are no hall-marks, but it is dated 1576. He exhibited also some designs of seals of the County of Glamorgan, from deeds preserved at Margam Abbey.

INSTITUTION OF CIVIL ENGINEERS.

AT the ordinary meeting of this Institution on the 27th inst., Mr. Alfred Giles, President, in the chair, two papers were read relating respectively to the construction and the electrical equipment of the Liverpool Overhead Railway. The first paper was entitled "The Liverpool Overhead Railway," by Messrs. J. H. Greathead and F. Fox, MM. Inst. C.E., and began with a history of the undertaking. Mr. A. G. Lyster, who had minutely studied the New York system and reported thereon to the Liverpool Corporation, had expressed himself in favour of an overhead electrical railway, and after some delay an Act was obtained in 1882 by the Mersey Dock Board for the construction of a double line of 4 ft. 8½ in. gauge. The estimate for this, fully equipped and worked by electricity, was 466,000l. The structure was intended to consist of plate girders, with overhanging continuous footways having parapets of iron lattice-work, with the rails laid upon greenheart planking; the whole being supported by columns of partial lattice-work placed in the normal structure, one on each side of the lines of dock-railway. Owing to the fact that many influential members of the Dock Board were unwilling to embark upon railway management, the undertaking was in 1887 leased to the present Liverpool Overhead Railway Company, by which the line was constructed. The length of railway at present worked was 5 miles, but would ultimately be 6¼ miles. In the structure decided upon the columns were placed vertically under the ends of the main girders, about 22 ft. apart from centre to centre, allowing sufficient width for two lines of standard gauge with the usual 6-foot way, and admitting the use of carriages 8 ft. 6 in. wide. Local circumstances in many cases did not, however, admit of the columns being placed immediately upon the main girders, and the latter were then carried upon cross-girders outside the line of columns. For considerable lengths also the columns had to be embedded in the boundary and warehouse walls. Owing to the presence of the dock lines below, cross-bracing of the piers in the usual way was impossible, and it was necessary to give to the columns and to the shallow cross-bracing connecting them at the top sufficient strength and rigidity to resist the lateral stresses due to wind-pressure, and, on curves, to the centrifugal force resulting from the motion of the trains. In carrying out the works no special difficulties arose in connexion with the foundations of the piers. In places where rock was not reached, masses of concrete were deposited of sufficient extent to insure the maximum load on the base not exceeding one ton per square foot. In excavating for the foundations the sill of the first dock made in Liverpool was discovered, and several lengths of old water-pipes, consisting of trunks of trees bored out and fitted together, were brought to light. Owing to the railway being placed immediately over the dock lines, the

latter were in many cases diverted, straightened, and improved. The columns supporting the viaduct consisted of two steel channel bars riveted to two steel plates, forming a box column with all the rivet-heads outside. These columns were grouted into cast-iron sockets bedded in and bolted through the blocks of concrete. Cast-iron bumpers filled with cement-concrete protected the columns from injury from passing wagons. The normal span was 50 ft., but longer spans up to 98 ft. and shorter ones of about 30 ft. were required in some cases. Up to 75 ft. span, the height of the girders above the rail-level did not exceed the platform height, and plate-girders were used. In longer spans bow-string girders were used. Between the girders was fixed Hobson's arched-plate flooring, consisting of $\frac{5}{16}$ in. plates bent to a radius of 12 in., with a flat surface 6 in. wide on the top, riveted to intervening-T-bars, and made water-tight by asphalt run in the V-channels between the arches. The structure was so designed that the spans could be put together and riveted up with floor complete at one or both ends of the railway, and be then transported over the completed portion of the structure to be placed in position. A special form of erecting-machine was provided, consisting of two lattice-girders standing upon legs resting on the ground at the front end, and at the hinder end upon a carriage running on rails on the viaduct. These girders were placed at such an altitude as to allow the trolley carrying the succeeding span to be rolled along underneath them. On these lattice-girders were placed two travelling cranes, so arranged as to lay hold of the spans on arrival, run them forward, and deposit them in their permanent position upon the columns which had been erected in advance. The average time occupied by this operation was one hour per span. In the course of the work several opening bridges had to be provided which were described and illustrated in the paper, as were also the stations, permanent-way, and rolling-stock. The total quantity of iron and steel in the structure was about 22,000 tons. The total capital cost, including equipment and all other charges, had been £550,000, or about £90,000 per mile of railway. The line was formally opened by the Marquis of Salisbury on February 4, 1893, and was opened for traffic on March 6 following. The electrical system of working was completely successful, a five-minute service of trains being maintained with perfect regularity and without mishap of any kind. The second paper was entitled "The Electrical Equipment of the Liverpool Overhead Railway," by Mr. T. Parker, M.Inst.C.E.

Correspondence.

To the Editor of THE BUILDER.

BEVERIDGE HALL COMPETITION, KIRKCALDY.

SIR,—I am instructed by the Professional Practice Committee to enclose copy of correspondence which has passed between the Association and the Town Clerk of Kirkcaldy. It may interest your readers to know that so far back as December 23 last it was pointed out that the conditions were such as would prevent representative architects from taking part in the competition.—Yours truly,

T. FAIRBAIRN,
Hon. Sec.

Edinburgh Architectural Association,
56, *Queen-street, Edinburgh*,
February 22, 1894.

CORRESPONDENCE BETWEEN THE TOWN CLERK OF KIRKCALDY AND HON. SECRETARY OF THE EDINBURGH ARCHITECTURAL ASSOCIATION.

I.—HON. SECRETARY OF THE E.A.A. TO THE TOWN CLERK OF KIRKCALDY.

W. ROY SPEARS, ESQ.,
Town Clerk,
Kirkcaldy.

56, Queen-street,
Edinburgh,
December 23, 1893.

SIR,—As instructed by the Council of the Edinburgh Architectural Association I beg to enclose Representation from them with regard to proposed Beveridge Hall, &c., competition, and to request that you will be good enough to submit it to the Committee as early as convenient.—Your obedient servant,

(Signed) T. FAIRBAIRN.
Hon. Sec.

COPY REPRESENTATION REFERRED TO.

The Royal Institution, Princes-street, Edinburgh,
December 23, 1893.

SIR,—A copy of the conditions laid down by the Provost, Magistrates, and Town Council of Kirkcaldy for the guidance of architects who may feel disposed to compete for the erection of the Beveridge Public Hall, Free Library, and Adam Smith Memorial Hall has been laid before the Professional Practice Committee of the Edinburgh Architectural Association, and with a request to examine the document and report to the Council of the Association thereon.

This they have done, and I am desired, in the name of the Council, who have carefully considered the report, to draw attention to three points in these conditions, which, in their opinion, are highly objectionable, and which they trust the Provost, Magistrates, and Town Council may see their way to amend.

These points are—

1. The amount of commission offered.

2. The power reserved to retain the three sets of designs for which premiums are offered, without employing the author of the first-premiated set to carry out the work.

3. The absence of any provision for the engagement of a professional assessor.

As regards the—

1st. The amount of commission offered being 4 per cent. is one-fifth less than the commission recognised by the Royal Institution of British Architects and the other Architectural Associations in the United Kingdom, and the result will be that architects of standing, who conform to the rules of the profession, will be deferred from competing.

2nd. The absence of guarantee that the architect of the first premiated set of designs will be employed in the erection of the buildings is quite sufficient to prevent any competent practising architect from competing, as there is no inducement to him to spend time in preparing designs which may cost him the amount of the premium to prepare —possibly more—and so leave him without any legitimate reward for his labour.

The 2nd and 3rd sets should be returned to their authors, as no architect with any respect for himself would appropriate the work of another competitor. Presumably the premiums are offered as some compensation for the trouble the unsuccessful competitors have been put to, and not as representing the value of the designs. This being so there can be no objections to the said drawings being returned to the authors.

3. The absence of any provision for the engagement of a professional assessor will inevitably prevent many architects from submitting designs, as it is quite evident that however able and well-intentioned a lay committee of judges may be, there are many points, both technical and artistic, which can only be fully appreciated by an architect, who has made the study of planning and designing the business of his life.

It is observed that the total cost, including three halls, library, subsidiary buildings, boundary walls, architect's and measurer's fees, and clerk of works' salary is not to exceed the sum of twelve thousand pounds sterling (12,000*l.*). The council of the Association had not an opportunity of examining the extent and situation of the proposed site, but it occurs to them that the sum of 12,000*l.* will prove very insufficient for all that is stipulated for, especially as the buildings are to be of a monumental character. They have thought it right, therefore, to refer to this, so that your committee may not afterwards be disappointed.—I am, Sir, your obedient servant,

WILLIAM ROY SPEARS, ESQ., *Town Clerk*, Kirkcaldy. (Signed) T. FAIRBAIRN, *Hon. Sec.*

COPY, LETTER, HON. SEC., E.A.A., TO TOWN CLERK, KIRKCALDY.

W. ROY SPEARS, ESQ.,
Town Clerk,
Kirkcaldy.

56, Queen-street,
Edinburgh,
February 9, 1894.

Beveridge Hall, &c., Competition.

DEAR SIR,—I am directed to remind you that I have not yet been favoured with a reply to my letter of December 23 last regarding the above.—Yours faithfully,

(Signed) T. FAIRBAIRN,
Hon. Sec.

COPY, LETTER, TOWN CLERK, KIRKCALDY, TO HON. SEC., E.A.A.

T. FAIRBAIRN, ESQ.,
Hon. Sec.
Edinburgh Architectural Association,
56, Queen-street, Edinburgh.

Town Clerk's Office,
Kirkcaldy,
February 10, 1894.

Halls.

DEAR SIR,—I have yours of yesterday, and also received yours of December 23. The Council have decided to adhere to the conditions of the competition. An Architectural Adviser, however, will be appointed.—I am, Dear Sir, Yours truly,

(Signed) W. R. SPEARS,
Town Clerk.

ORIENTATION IN ARCHITECTURE.

SIR,—In connexion with your leading article in your issue of February 17, will you allow me to add some further remarks to my letter of December 16? The investigation of the general question of the relations between architectural structures and the celestial bodies is evidently in the way of being considerably advanced in the course of the next few years. Obscure though the subject is, it is important and attractive by its very obscurity. Its importance appears to me to lie in the fact that the question has manifold bearings—it touches, perhaps, primarily, religion and related fields of psychology; it touches architecture and archæology; it touches astronomy and it touches chronology. In short, it promises to make no inconsiderable accession to our general knowledge of human progress.

But there is evidently a vast amount of work to be done in the way of actual observation and measurement, and in the critical discussion of conclusions, in order to determine what orientation will and what it will not explain, and to distinguish between intentional and conscious orieniations of the builders themselves and orientations which perhaps only modern theorisers have discovered. When this knowledge has been gained we shall have materially widened our views upon the signification of ancient monuments, the mental attitude of their builders, and the meaning of more than one point of modern ceremonial observance.

As yet the subject is all involved in obscurity, our ignorance is much greater than our knowledge. We have not, as I said, yet ascertained how much the ancients themselves intended and knew as to the orientation of their own constructions. To be candid, we ought to confess this frankly and keep it always in mind. We ought also to endeavour never to lose the guidance of common sense, nor, as your leading article warns us, allow ourselves to view a broad question only through our own particular spectacles.

I write this for no more special purpose than to help to draw the attention of your readers to the subject. That my former letter, with the exception of the kind explanations from Mr. Penrose, has led to no further correspondence is very possibly owing to the novelty and obscurity of the subject. I should like to take the opportunity of calling attention to the articles by M. H. Nissen, of Bonn, in the Rheinisches Museum für Philologe, to which Mr. Penrose alludes in his own Royal Society paper. M. Nissen's articles are a long series, and apparently not yet concluded. He handles his subject in thorough German fashion—that is, the papers are neither short nor superficial. At the same time they are not over-clouded with mysticism. The author deals first with the churches and temples at Rome, then with the Egyptian and Greek temples. Though he approaches the last-mentioned from a different point of view, he comes to one general conclusion at variance with Mr. Penrose's position; he says, with regard to their possible stellar orientation, that so far as his examination of the material goes, there can be no question of alignment towards stars during the earlier periods, though it may be proved, to a limited extent, for Hellenistic and Roman times. M. Nissen, therefore, contents himself with an attempt to derive the month-dates of the festivals. Mr. Penrose's attempt at a combined stellar and solar orientation is much more hazardous, and I must think it more interesting and suggestive than convincing or conclusive. I am still unable to assent to his general principle that the temples were directed to stars in order that the priests might know the time by them.

I am bound to say this appears to me far too trivial and practical a purpose to have controlled the laying-out of a sacred edifice. If we can accept this, we could equally accept Mr. Lockyer's position that the Egyptian Temples were primarily "star-pointers," the archetype of the modern astronomical observatory.

It would be safest to proceed simply from such broad underlying principles as that the heavenly bodies were for the ancients visible manifestations of divinities; that as temples were built as their abodes upon earth it was but natural to bring such buildings into relation with their abodes in the heavens, with the visible manifestations of their presence there; that if the purpose of the orientation was not actually liturgical, it was at least symbolical. The orientation of a Christian church is now, I suppose, merely traditional, a pure survival; possibly the orientation of an ancient temple was already little other than symbolical, seeing that the practice prevailed at the vastly more remote period of the great stone monuments.

I should have liked to refer to the difficulties of obtaining accurate measurements of orientations, but this letter is already over-long. I will conclude by quoting a couple of instances of indicated orientation from the Old Testament, which may have escaped notice. One is an allusion in the book of Job (xxxviii. 4, 5) to the Egyptian foundation ceremony of "stretching the cord"; "Where wast thou when I laid the foundations of the earth? . . . who hath stretched the line upon it?" The other is in the description of the Tabernacle in the wilderness in Exodus xxvii., where the construction of the north, south, and west sides of the court are described, while the *east* is left for the entrance.

ENQUIRER

SURREY COUNTY COUNCIL SURVEYORSHIP.

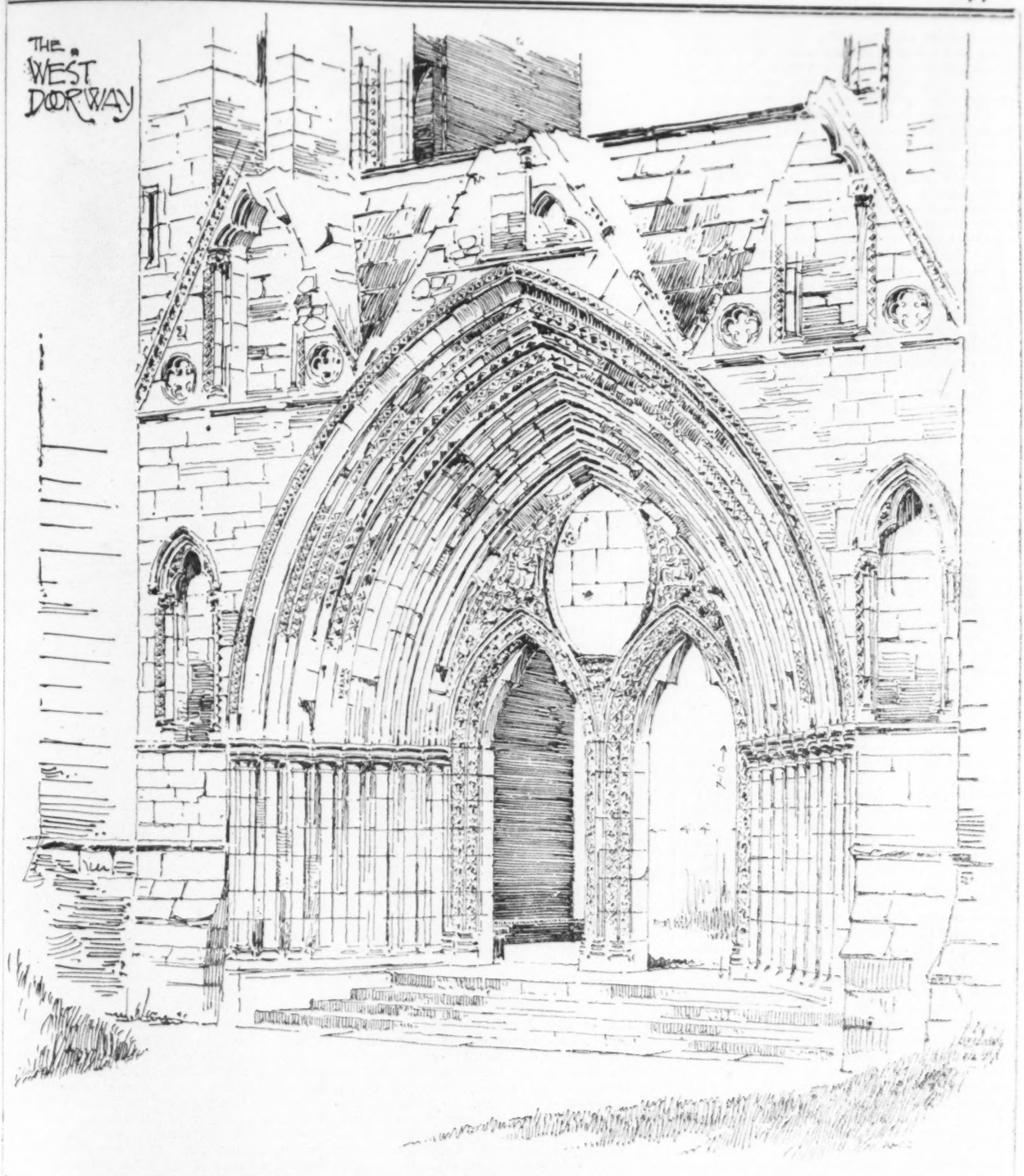
SIR,—I read with interest your "Note" in this week's *Builder re* above matter. You only mention Mr. Bidder as having protested against the manner in which the whole matter was carried through.

I wish particularly to have it stated that I seconded his motion, and that his only other supporter was Mr. Roberts, of Richmond. I wish this, as I should be exceedingly annoyed were any one who knows me to suppose that I had allowed such gross neglect of the public interest to pass unnoticed. As a matter of fact, I was the first to call public attention to the matter on the Council at the November meeting, being supported on that occasion only by Mr. Roberts.

May I also say that while fully endorsing your remarks as to the impropriety under the circumstances of the chairman's giving his casting vote, I cannot but think that the point which I have all along commented upon is of even more importance —namely, the conduct of the special committee in placing Mr. Howell's name in the list of four candidates which they submitted for the final decision of the Council.*

This committee had before them testimonials from

* We had already commented strongly on this point, to the same purport as our correspondent, in a "Note" published at the time of the election of the Surveyor.—ED.



In 1390 occurred the burning by the Wolf of Badenoch, an Earl of Buchan and son of the king, Robert II. Little better than a robber chief, various offences against the Church dignitaries led to his excommunication by Bishop Barr; the raid was in retaliation, and much more than the cathedral was involved; St. Giles' Church, the Maison Dieu, and eighteen manses of the canons and chaplains were burned. The sacrilege excited great horror, the bishop appealed to the king, and the ravager had to submit to public penance in the church of the Blackfriars, Perth, and thereafter by donation of certain lands and of gold, make some measure of restitution. Obviously, however, the punishment imposed failed of terrorising like evil-doers, for only twelve years later another powerful chief, also presuming on high birth—for he was son of the Lord of the Isles—fell on the church and plundered it. The attack, we may believe, would be directed against removable valuables, so his raid may have left the building untouched. That of the Wolf was one of revengeful destruction, and must have damaged the building seriously, though to what extent positively is not known. The Chapter House seems to have suffered most, and would appear to have been almost wrecked, from the fact that seventy years later restoration required a complete interior casing of masonry, and new windows; the three outer south aisles of nave west of the transept and the west doorway seem all to have suffered—at least, these parts have been renewed at a date clearly subsequent to the burning.

During the episcopate of Bishop Spynie, 1397-1406, the central tower was begun; it may either be that he completed what till then had been unfinished, or that from the foundation, new piers were built. There are other notices of the progress of this work, carried forward by Bishops Innes and Lichtoun, the latter translated to Aberdeen in 1414. However, in 1506 this tower fell, but no cause is assigned for the disaster. In Bishop Columba Dunbar's time, 1422-1435, the west gable had its present large window inserted; as suggested, it may be because of damage done to what had existed previously, doubtless windows in tiers as at the east-end, but perhaps only because of the current vogue in favour of the large single window. This window is noticeable for its acute arch, more pointed than the lancet, unusual in work so late. At the same time the rich interfilling of the doorway under seems to have been added. It is a double opening with a vesica panel between, in front of which was a figure, now removed. At the same time the two west responds of nave arcades have been restored, and the decline in grace of moulded profile is seen in the bell of the capitals there, a sharp angle without undercutting taking the place of the usual curve.

On the wall of south tower, facing the nave, are the remains of plastering, and as adjoining fine ashlar work it may be presumed painted decoration was intended.

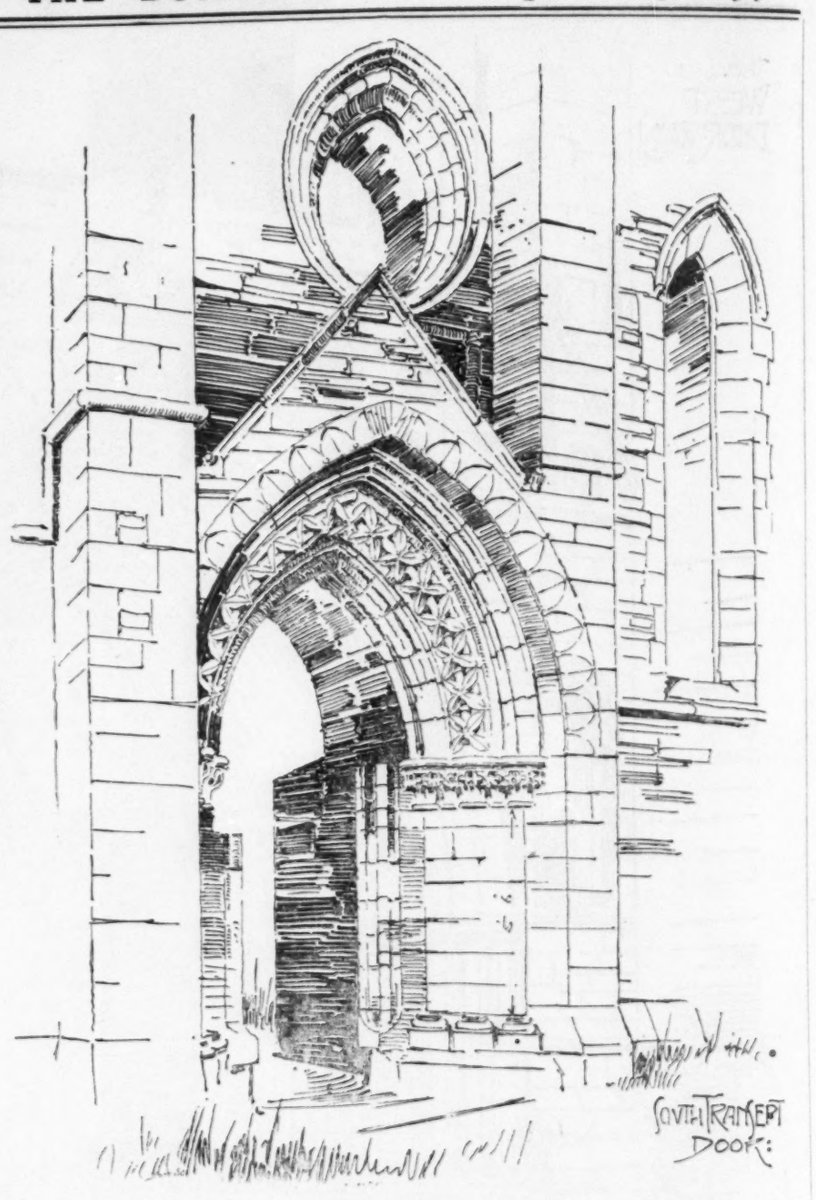
In 1462 the Chapter House was restored, and dedicated to the Passion, by Bishop David Stewart. A shell of interior masonry was built and new windows inserted; all the tracery has gone now; one was restored some thirty years ago. The south wall alone has not been veneered, and it shows, over the doorway, a row of four arched recesses, once occupied, it is said, by figures of the Evangelists. The centre pier and the vaulting springing from it is graceful, but the carving throughout is indifferent. At the north wall is the dean's raised seat, above is an arcade, omitted on the other sides of the octagon, as if the pro-

jection of the new masonry, that is not carried down to the floor, has been masked by the stalls of the clergy; on the north-west side of the centre pier is built a projecting desk—for the reading of the martyrology it is supposed.

At this same time, apparently, the Lavatory was formed off the vestibule, with access through what was probably before a porch door that was reduced, and in the small apartment found a basin-trough was placed, and in the south wall a fire-place formed. Local interest attaches to this little room as having been taken possession of by a poor woman, who here nursed a son, afterwards General Anderson, founder of the Elgin Institution. The sacristy may have been situated in one of the west towers, either on the ground or the upper floor, where there are various apartments. In 1506, as mentioned, the central tower fell; nine years later its re-erection was begun by Bishop Forman and completed in 1538. What the extent was of the piers that this second time were employed to support the tower is not now very easily found; one abutment of the period alone remains at the south-west angle. In any case the piers have been insufficient, for this tower, too, fell in 1711. The view given by Slezer shows a square tower with single lights in each face; a corner turret rises higher at the north-west angle; at that and the south-west angle are canopied niches containing large statues; doubtless the same occurred at the other angles. Not unreasonably we may connect the three large figures on the ground in nave south aisles with these niches. One is a bishop, and generally identified with Bishop Innes; his tomb, it is recorded, was at the north-west base of the earlier tower, and was most probably destroyed when that tower fell. The second figure is fragmentary—a kneeling ecclesiastic, so it may represent a founder of the new tower, Bishops Forman or James Hepburn. The third figure is a knight in armour. The height of this central tower is given as 198 ft., which must include some steeple or saddle-backed roof. This was the latest addition made to the cathedral.

1568 saw the beginning of many reverses; in that year the roofs were stripped of their lead, the same fate befell Aberdeen, and the cause was the necessity for providing ammunition for the Scottish troops, then in Holland. After the Reformation it would seem that the church was only partially used, though so late as 1594 mass was said within its walls, and even until 1640 its ruins were resorted to by worshippers. The Protestant episcopal party held their services in the church of St. Giles; their first prelate, Bishop Douglas, was buried there; and a tomb erected that subsequently was removed to its present site in the north part of the cathedral grounds. In 1637 the choir rafters were blown down by a high wind: it may be noted that the account of this mishap includes the statement that the roof had been left without slates eighty years before—that is eleven years previous to the lead-stripping referred to. Whether the roofs of the transepts, nave, and west tower existed even so late as this date is uncertain. Three years later the rood-screen was wilfully destroyed; it is described as of timber, with crucifix excellently painted, having gold stars facing west, and a painted doom facing east. The appearance of the building fifty years later may be judged of from the "Theatrum Scotiæ." In 1711 the tower fell, and either with it brought down the north transept and the nave arcades, or so fractured these parts that their collapse was not long averted. The mass of ruins, however, was not suffered to encumber the ground long, being gladly seized upon by all requiring building material. The Crown authorities were the custodians of the edifice, but they were quite indifferent to its protection, all honours in that direction going to a sexton, one John Shanks, whose memorial is that for many years he devoted himself single-handed to the clearing away of all rubbish, while preserving all of carved and moulded work. After his time the ruins have been and are well cared for by the Commissioners of Woods and Forests.

There are various monuments of interest in the church. The earliest is a wall-tomb on the north side of the choir; the opening is on the ground level, under a cusped arch that is enclosed within a gable. Strangely enough, for whom the tomb was intended is not positively known. Bishops Barr or Spynie are suggested, as both were buried in the choir, though their dates are later than quite suits the tomb. A similar, but plainer, wall-recess is in Kirkwall Cathedral nave. The adjoining canopied tomb, that fills up the arch between choir and north aisle, also wants identification; Bishop Patrick Hepburn, d. 1573, the last of the Roman Catholic prelates, is suggested. Two tombs in the north transept gable have been demolished; only the effigies remain; these are of Bishop Dunbar and Sir Alexander Dunbar, 1429-97, father of Bishop Gavin Dunbar, of Aberdeen. Of the same period as the tombs destroyed is a projecting table along north and east walls, having a pannelled front. The two tombs in the south transept are those of the brothers Stewart, Bishops James, 1459-61, and David, 1462-76; the east tomb has an almost flat top, the adjoining one an ogival head. Other wall tombs are; of Bishop Winchester, 1437-58, and Sub-Dean Lyell, the first showing traces of decoration on its arch-soffit; and there are two tombs of sarcophagus type, to William de la Hay, d. 1421, and to the first Earl of Huntly, d. 1470; all these four monuments are in the choir south aisle, called St. Mary's. In the Chapter House are one or two seventeenth-century classic monuments that do not call for remark. The sedilia is unfortunately almost obliterated; it is under a window that, in consequence, has its sill raised a couple of feet; it had four bays or canopies, and flat pinnacles at each end. In the choir is set up a fragment of a Celtic cross discovered in 1823 in the town; it is part of the shaft, 2½ ft. wide, and 1 ft. thick. In the nave is a stone coffin built into the south wall, traditionally believed to have contained the body of King Duncan, wounded in battle by Macbeth, before removal to Iona, in 1046. In the choir is a large slab that has been covered with brass in the same way as a similar one in St. Andrews Cathedral; here also the metal is removed; it is generally supposed to mark the grave of Bishop Moray, 1223-42, but it may belong to a later date.



South of the cathedral are the remains of a Bishop's cross; the shaft has gone by the base; it surmounts three or four steps. North-west of the cathedral is the Bishop's Palace, built by the last prelate, Patrick Hepburn: previously their residence was at Spynie. The place stands almost intact, excepting a portion that collapsed three years ago; this in spite of provision to ensure stability by iron ties. Only recently it has been mooted to re-erect the fallen parts, and success must be wished the project.

In the Chapter House are preserved all fragments of carved work found. Some of the capitals of the pier that divided the double aisles are particularly well cut, and have quite the best foliage to be met with in the building. The capitals about the choir are all moulded, carving being confined to the label stops—all heads—the dog-tooth flower in many varieties, and in enriched strings. In the nave, south aisle, are some excellently-carved corbels; at the west door may be compared two periods of carving.

Shaw's "History of the Province of Moray," published about the middle of last century, but amended in a more recent edition, is the chief authority on the subject.

VENDRAMINI PALACE.

THIS view of one of the finest of the Venetian palaces is published as an illustration to Professor Aitchison's Fifth Royal Academy Lecture, given on another page. Well known as the Vendramini Palace is, we are glad to have an excuse for including a view of it in our pages, where it has not been illustrated, at all events, for many years back.

It belongs to the period of about 1600 or thereabouts, and is a rather curious example of the blending of Gothic feeling (which survived longer in Venice than in Rome and Florence) with Renaissance detail.

SOME RENAISSANCE PALACES.

THESE four well-known Palaces are also given as illustrations to Professor Aitchison's lecture, in which they are referred to.

The Farnese Palace at Rome was built about 1530 from the designs of San Gallo, the courtyard facades having been afterwards somewhat modified by Michelangelo. The Cancellaria Palace at Rome was the work of Bramante; the Rucellai Palace at Florence that of Alberti, about 1460. There is a family likeness between these two in the method of using the pilasters, which gives them a certain similarity of character. The Pitti Palace at Florence has been attributed to Brunelleschi, and was built somewhere about 1440. It is imposing from its great scale and massiveness of treatment rather than from any elaboration of detail.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Mr. John Hutton, the Chairman, presiding.

Salaries of Heads of Departments. — The General Purposes Committee reported that they had before them applications from the following heads of departments for a reconsideration of their salaries—viz., Mr. A. R. Binnie, the chief engineer; Mr. T. Blashill, the architect; Mr. W. A. Blaxland, the solicitor; Mr. W. J. Dibdin, the chemist; and Mr. Andrew Young, the valuer. In addition to these, the Public Health and Housing Committee had brought before them the question of the salary of Mr. Shirley F. Murphy, the medical officer of health. The Committee added that they had carefully considered these applications, and they recommended that the salary of Mr. A. R. Binnie, the chief engineer, should be raised from 1,500*l.* to 2,000*l.* a year by two annual increments of 250*l.*; and that the salary of Mr. Murphy, the Council's medical officer of health, should be increased from 1,000*l.* to 1,250*l.* a year from April 1. A long discussion took place on these recommendations, but it was ultimately agreed, after several amendments had been proposed and lost, to grant the recommended increase of salary to Mr. Binnie. The other recommendation was negatived.

Policy of the Council as to Water Supply.—The adjourned report of the Water Committee was then considered. As we gave the substance of the report last week, page 157, we need now give only the recommendations of the Committee, which were as follows:—

"(*a*) That negotiations be entered into for the purchase of the undertakings of the water companies, or one or more of them, at a fair and reasonable price, on the basis of a desire to purchase and willingness to sell; having regard to any circumstances and statutory provisions affecting the present and prospective position, income, expenditure, liabilities, obligations, and value of the companies respectively and their undertakings, including any present and probable future demands for improvements and extensions of works, and new or additional sources of supply, and on the understanding that if satisfactory terms cannot be mutually agreed upon an application will be made to Parliament to determine in what manner and on what conditions a transfer to the Council shall be arranged.

(*b*) That the Water Committee be authorised to negotiate on the above lines, and to prepare details of the basis of arrangements."

Mr. Hopkins, the Chairman of the Committee, in submitting the report, said that there was no time to lose, as their hands had been forced by the march of events. Some of the conclusions of the Royal Commission were surprising. The Commission had found that, without going outside the Metropolitan area, it was possible to obtain water sufficient for the Metropolis in 1931. The water companies had put upon that finding a construction that it would not bear. The Commission had reported that as a physical fact that quantity of water could be obtained within the Metropolitan area, but it was not to be inferred that they would be justified in taking it. As a matter of fact, the Commission had been careful to avoid any assertion on the question of policy. After the issue of the report, they found themselves confronted by three formidable Bills promoted by three water companies. These Bills professed to be backed by the report of the Commission. The companies asked for powers that would greatly augment their vested capital. Two of the companies asked for powers to construct works of huge magnitude and great permanence, while the Southwark and Vauxhall Company had had the boldness to ask, in the name of the united companies, for power to take from the Thames the whole of the water running down to Teddington, with the exception of 200,000,000 gals. a day. He did not believe that Parliament would grant anything like such powers, which would be disastrous to the hopes of the people of London. Immediate action was necessary, because those Bills would soon be before Parliament. If the Council could show that they were willing and able to undertake, on fair and just terms, and to carry on the water supply of the Metropolis, all pretext for addition to the vested interests of the companies would be removed. It was contemplated by the Royal Commission that there should be taken from the Thames 300,000,000 gallons, from the Lea 52,500,000, and from springs and wells 67,500,000 gallons, making an additional volume of 420,000,000 gallons per day. He would not criticise those figures, though it was believed in influential quarters that their adoption would be attended with extreme peril to London. The scheme depended upon nine large reservoirs being made in the neighbourhood of Staines, and he would only say that the practicability of making those reservoirs was seriously doubted by eminent engineering and geological authorities. One aspect of the question—namely, the financial aspect, had not been dealt with by the Commission. The general estimate of the companies was 9,702,675*l.*, which, with inevitable extras, would come out at about 10,000,000*l.* Mr. Binnie, whose authority as a water engineer was second to none, was distinctly of opinion that the cost of those reservoirs would not be much less than double the sum mentioned by the promoters. The scheme contemplated the employment of a thorough system for the prevention of pollution, and that would require the employment of an army of inspectors. He urged the Council to adopt the recommendations of the Committee, embodying as they did the first of a series of steps which it was of great importance that the Council should take.

Mr. Saunders, M.P., moved that the following words be added to the recommendation (*a*):—"Provided that no monopoly right on the part of the water companies be recognised." If, he said, the water companies possessed a monopoly right they could only be bought out at enormous cost. Of course they had no such monopoly right, and it was merely to guard against any misconception on that point that he moved the addition of those words.

Mr. Harvey seconded the amendment, which was accepted by the Chairman of the Committee.

Colonel Rotten asked whether the Council had any legal right to compete with the water companies.

Mr. Hopkins said there was nothing whatever in the law to prevent the Council establishing a competing supply.

Lord Farrer said he was not going to oppose the report, though he doubted whether the present was a favourable time for negotiating with the companies, which were just now elated on account of the finding of the Royal Commission. Until the Commissioners' report was pulled to pieces by criticism, he did not think the public would be quite aware of what it meant. On the other hand he recognised that there were reasons for approaching the companies with terms of purchase, which would place the Council in a better position to oppose their scheme. He suspected that the negotiations would be useless. He desired to indicate certain precautions which he thought the Council should take. It was desirable for it to enter the contest with as many allies as possible. On a former occasion they were in alliance with the Corporation of the City of London, but perhaps it would not be so easy to secure the co-operation of the City after the publication of the report of the Special Committee on London government. West Ham and the other districts outside the county had shown themselves to be very interested in the question, and he thought it would be well also to secure them as allies. Then there was the question of the Council's relation with the Thames Valley districts. The suggested scheme, which involved the employment of an army of inspectors, would mean that every house and garden on the banks of the river would be liable to invasion and inspection at any moment, and that would bring the occupiers up in arms and in open rebellion. The engineer said it would be necessary that there should be no cesspool within four hundred yards of the Thames and its tributaries, and were such a rule to be enforced the valleys would be depopulated. He hoped the Council would try and act in concert with the County Councils on the banks of the Thames. It was important to go into Parliament well armed and equipped for what he was sure would prove a very long and difficult fight.

Mr. Lloyd thought Parliament should be called upon to say that any expenditure the companies might be put to for future extensions should be met by the Council, which would then become the owner of the new works.

Dr. Collins deplored the short limit of time taken by the Commission as the basis for estimating the future needs of the metropolis. The real question, he thought, was whether London should continue to drink purified sewage or whether it should seek an adequate supply from some distant watershed, which would be secure from contamination. The Commission had not taken into account many significant facts, and, among others, that the outbreak of cholera in 1866 was traced to the water supplied in East London. It was not difficult to take the view that the report of the Commission was a procrastinating one, leading to no satisfactory conclusions.

Sir John Lubbock said there seemed to be a general consensus of opinion on the part of the Councillors who had spoken that a new source of supply ought to be secured. He thought the Council had quite as much work already as it could satisfactorily get through, and that it was undesirable for it to assume a new responsibility and burden by taking over the water companies. It was said that the result would be a saving in the rates. He believed, on the contrary, that it would involve an addition to the rates. The Council ought not to break its own back, and he thought that in negotiating with the companies it would be making a mistake.

The recommendations of the Committee, as amended, were agreed to.

Lord Monkswell moved as an additional recommendation:—

"That, while carrying on the negotiations above referred to, the Committee be instructed to communicate with the various authorities affected or interested, to ascertain their views on the subject generally."

This was seconded by Mr. Torrance, and also agreed to.

New Buildings.—The report of the Theatres and Music Halls Committee contained the following paragraph:—

"We occasionally find that after drawings for a new place of public entertainment have been approved by the Council, no further steps are apparently taken by the applicant, and the premises are not erected. This we think is undesirable, as the Council is not perhaps cognizant of the position of affairs until a further application is made and drawings are submitted in connexion with another scheme for building on the site. We therefore recommend—

'That in future when drawings with respect to new premises to be used for public entertainments are approved by the Council, it be upon condition that the works in connexion therewith be commenced within six months from the date of the approval of such drawings by the Council.'"

The recommendation was agreed to.

After transacting other business the Council adjourned at half-past seven o'clock.

PROPOSED LOCAL MUSEUM AT EPPING FOREST.—On the 24th ult. a meeting, convened by the Essex Field Club in furtherance of the proposed Epping Forest Free Local Museum, was held in the banqueting-room, Queen Elizabeth Lodge, Chingford. Professor Meldola explained the aims and objects of the scheme, which were that a free local museum to illustrate the natural history, history, archæology, &c., of the district would be a suitable addition to the many attractions the neighbourhood of Epping Forest now possessed. The Queen Elizabeth's Lodge at Chingford, having been carefully preserved by the Conservators under the Act of Parliament as an object of antiquarian interest, was admirably fitted for the purposes of a local collection of the kind proposed. The council of the Essex Field Club would be willing to undertake the gathering together of specimens, and the curatorship and scientific superintendence of collections as a branch of the central museum. Before any steps for the actual formation of the museum can be taken the sanction and co-operation of the Epping Forest Committee will be necessary. It is estimated that 300*l.* would be required for the necessary museum appliances, but a sum of from 150*l.* to 200*l.* would justify them making a start. A resolution in favour of the scheme was carried, and a subscription-list opened.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION:

ANNUAL GENERAL MEETING.

THE twenty-seventh annual general meeting of the donors and subscribers of this Institution was held on the 27th ult. at the offices of the Institution, 21, New Bridge-street, E.C., Mr. William Shepherd in the chair, supported by Mr. E. Brooks (Treasurer), and by Messrs. E. C. Roe, W. Seymour, J. A. Robson, C. K. Turpin, F. S. Oldham, H. W. Parker, A. Stansfeld, H. T. Desch, O. Newling, W. D. Gilbert, and other gentlemen.

The report stated that the income for the past year had amounted to £674 16s. 9d., of which sum £257 4s. 6d. consisted of annual subscriptions, £299 0s. 0d. in donations, £116 17s. 4d. in dividends, and £1 14s. 11d. interest on deposit account. The total expenditure was £458 13s. 6d. of which 335*l.* was paid for pensions, and 25*l.* in various grants for temporary relief. Two elections were held during the year, Mrs. Martha Marcham being elected at the first and Mrs. Louisa Clark at the second. Two pensioners had died during the year, viz., Mrs. S. A. Coulson and Mrs. L. R. Styles. The number of pensioners now on the books is 17; the total number elected since the foundation being 37. Referring to the Orphan Fund, the committee reported that the Institution had now two vacant presentations to the Orphan Working School, and the committee were prepared to receive applications on behalf of builders' clerks' orphans, whose friends may wish to nominate them for election. The fifteenth annual dinner was held on the 18th of April last at the Cannon-street Hotel, Mr. W. A. Colls occupying the chair. The result was highly gratifying alike to him and to the committee, the sum of 320*l.* having been announced in aid of the funds. The committee had the painful duty of recording the death of the President (Mr. W. A. Colls) which occurred in October last, and which was the first instance, since the Institution was established, of its loss of a President by death during his year of office. By the untimely death of this gentleman the committee feel that they have lost a personal friend, and the Institution one who took an earnest interest in its welfare. Mr. Colin G. Patrick kindly completed the year of office broken by Mr. Colls' death. Mr. William Shepherd had favoured the committee by consenting to act as President for the present year. The committee announced a further purchase of stock, bringing up the total of invested funds to 4,550*l.* The report concluded by thanking the donors and subscribers for the assistance rendered.

The President Elect (Mr. Wm. Shepherd), in moving the adoption of the Report, said that it seemed to him that the Institution was deserving of support; those who composed it, in looking to the future, could not be expected by reason of their position to seek help of a legislative character which, perhaps, would not be thought at all derogatory in some other cases. It certainly seemed to him that it was a duty to make, in some way, provision in the event of need arising, and that it was, therefore, the duty of everyone of them as far as possible to help in maintaining such an institution as this—a duty to assist in the matter, and band together for mutual benefit. The number of builders' clerks at present supporting it was not so great as he should like to see. The Institution was a good one, and he could not see why more clerks did not belong to it. Mr. Shepherd concluded by moving "That the report, &c., be adopted and circulated amongst the subscribers."

Mr. W. D. Gilbert seconded the motion, which was put and carried unanimously.

A resolution was then proposed by Mr. E. Brooks and seconded by Mr. C. K. Turpin, thanking Mr. Colin G. Patrick (who had kindly completed the year of office unhappily broken by Mr. W. Colls' death) and the other retiring officers for their past services, which was also unanimously adopted.

On the motion of Mr. E. C. Roe, seconded by Mr. F. L. Oldham, the following gentlemen were elected officers for the ensuing year: viz., Mr. Wm. Shepherd, as President; Mr. John Burton, as Vice-President; Messrs. S. J. Thacker, T. Stirling, and Ernest S. Rider, as auditors. While a number of gentlemen whose term of office had expired by rotation were again elected as members of committee, and in addition Mr. H. T. Desch (Messrs. Cubitt & Co.) and Mr. O. Newling (Messrs. Colls & Sons) were elected members for the first time.

ARCHITECTURAL SOCIETIES.

CARDIFF ARCHITECTS' SOCIETY. — At the Lecture-hall of the South Wales Institute of Engineers, Cardiff, on the 21st ult., Mr. Edwin Seward, F.R.I.B.A., delivered a Presidential address to the members of the Cardiff Architects' Society. Mr. Seward dwelt upon the architectural growth of the principal European cities, and gave an outline of what the future of Cardiff should be. After alluding to the fact that members of provincial centres might now share with Fellows and Associates many of the advantages of the Royal Institute of British Architects, Mr. Seward stated that, under the new alliance the younger members and students from South Wales could sit for their periodical examinations in connexion with the Cardiff Centre. Proceeding, Mr. Seward said:—These benefits have for some years been shared in larger towns, as Manchester, Liverpool, Sheffield, &c., but in Cardiff they may be said to still lie before us. If Cardiff will show as much activity and enterprise in the art of true architecture as in the art of building, it may well be hoped that in a few years we may feel there has been but little lost time, and our town may yet compare with, at any rate, commercial cities like some of those I have named. . . . When I was asked to deliver a first Presidential address to this Society, I thought at once of some of the grand works of the old architects which it is a true delight to think and talk about. But we live in too progressive an age to linger overmuch on the past, and, again, we must not act so entirely in the living present that we have not leisure to attempt a discerning of the future. It seemed evident, therefore, that the subject matter of this address should be one that will allow us to glance back, to look around, and to gaze forward. In doing this, I want, if possible, to adorn my tale with art pictures of beauty from far and near, and to point my moral here in Cardiff—in Cardiff as it was and as it, perhaps, might be. I also desire to make suggestions illustrating the desirability of entering upon the consideration of a comprehensive scheme which may of itself open up, not one site for public buildings, municipal and otherwise, but, more probably, one dozen such sites. To my brother architects I would say that few objects could be found more likely to conduce to the honour and benefit of our profession than this, and few subjects could be more attractive to us as loyal townsmen. Mr. Seward proceeded to explain a large number of views of fortified and other towns and buildings in the different countries of Europe, demonstrating the architectural magnificence of the past two or three centuries, and said that municipal authorities in the Middle Ages, although, perhaps, not educated, had a high appreciation of the beautiful in architecture. Mr. Seward also urged the desirability of paying due regard to the question of open spaces in our principal towns. He also unfolded a scheme embodying the considerable re-modification of the town of Cardiff upon lines already suggested, to some extent, by the municipal authorities. The meeting closed with a cordial vote of thanks to the President for his address.

GLASGOW ARCHITECTURAL ASSOCIATION.—On the 17th ult. a lecture was delivered in the rooms, 114, West Campbell-street, by Mr. George Walton, the subject being "Interior Decoration." In the course of his address the lecturer urged that simplicity and not elaboration should govern the work, and ornament, if used at all, should be used sparingly, and should be very fine and well adapted for its position. Pictures have their decorative value, and this has perhaps been overlooked by the artists of to-day, who, in the opinion of the lecturer, might act a little more in unison with the architect in creating work for permanent positions. In the decoration of an ordinary commonplace house, the aim should be to get rid of the ugly portions, having them replaced by suitable decorations of an artistic value. The treatment of ceilings, walls, and floors was dealt with at length by the lecturer, who described various methods of producing good results by the harmonious employment of the materials.

A PARISH CHURCH LIGHTED BY ELECTRICITY.—The Parish Church of Leamington has been lighted by electricity. From the central dome depends a 24-light electrolier, and an ornamental 10-light pendant is fixed to the roof of the sanctuary. The nave, transept, side aisles, and choir-stalls are lighted by incandescent lamps attached to brackets on the caps of the pillars. Altogether there are 188 lights, 120 being of 16-candle power each, and the remainder 25-candle power each. The current will be supplied by the Midland Electric Supply Company.

ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—On the 21st ult., at a meeting of the British Archæological Association, Mr. Allan Wyon in the chair, the Rev. H. T. Owen gave a description of the excavations which he has had effected at Valle Crucis Abbey, Llangollen. The entire ground plan of the Cloister Court has been laid open for observation, the remains being extensive. Mr. Frank Williams reported the uncovering of a long length of the Roman Wall of Chester, at the Roodeye, during some building operations; also some discoveries in Watergate-street. Mr. Matthews Jones, City Surveyor of Chester, gave particulars of some other discoveries in Watergate-street, where a portion of a Roman villa has been found, and carefully preserved for inspection. Mr. Oliver sent a rubbing from a brass at Lynn, in which the old custom of "Riding the Stang" is represented beneath the effigy of the deceased, who is commemorated on the brass. Mr. Bodger exhibited a fine collection of Roman coins found near Castor, Northants, some having Greek inscriptions. Mr. Loftus Brock described some Roman coins found at Springhead, Gravesend, on which Christian emblems were represented. They were of emperors later than the time of Constantine. He exhibited also a coin of Crispus. On the reverse, the emperor held a standard in each hand, both standards having the monogram of Christ. The Chairman exhibited a silver Communion cup, belonging to St. Stithian Church, Cornwall. There are no hall-marks, but it is dated 1576. He exhibited also some designs of seals of the County of Glamorgan, from deeds preserved at Margam Abbey.

INSTITUTION OF CIVIL ENGINEERS.

AT the ordinary meeting of this Institution on the 27th inst., Mr. Alfred Giles, President, in the chair, two papers were read relating respectively to the construction and the electrical equipment of the Liverpool Overhead Railway. The first paper was entitled "The Liverpool Overhead Railway," by Messrs. J. H. Greathead and F. Fox, MM. Inst. C.E., and began with a history of the undertaking. Mr. A. G. Lyster, who had minutely studied the New York system and reported thereon to the Liverpool Corporation, had expressed himself in favour of an overhead electrical railway, and after some delay an Act was obtained in 1882 by the Mersey Dock Board for the construction of a double line of 4 ft. 8½ in. gauge. The estimate for this, fully equipped and worked by electricity, was 466,000*l.* The structure was intended to consist of plate girders, with overhanging continuous footways having parapets of iron lattice-work, with the rails laid upon greenheart planking; the whole being supported by columns of partial lattice-work placed in the normal structure, one on each side of the lines of dock-railway. Owing to the fact that many influential members of the Dock Board were unwilling to embark upon railway management, the undertaking was in 1887 leased to the present Liverpool Overhead Railway Company, by which the line was constructed. The length of railway at present worked was 5 miles, but would ultimately be 6½ miles. In the structure decided upon the columns were placed vertically under the ends of the main girders, about 22 ft. apart from centre to centre, allowing sufficient width for two lines of standard gauge with the usual 6-foot way, and admitting the use of carriages 8 ft. 6 in. wide. Local circumstances in many cases did not, however, admit of the columns being placed immediately upon the main girders, and the latter were then carried upon cross-girders outside the line of columns. For considerable lengths also the columns had to be embedded in the boundary and warehouse walls. Owing to the presence of the dock lines below, cross-bracing of the piers in the usual way was impossible, and it was necessary to give to the columns and to the shallow cross-bracing connecting them at the top sufficient strength and rigidity to resist the lateral stresses due to wind-pressure, and, on curves, to the centrifugal force resulting from the motion of the trains. In carrying out the works no special difficulties arose in connexion with the foundations of the piers. In places where rock was not reached, masses of concrete were deposited of sufficient extent to insure the maximum load on the base not exceeding one ton per square foot. In excavating for the foundations the sill of the first dock made in Liverpool was discovered, and several lengths of old water-pipes, consisting of trunks of trees bored out and fitted together, were brought to light. Owing to the railway being placed immediately over the dock lines, the

latter were in many cases diverted, straightened, and improved. The columns supporting the viaduct consisted of two steel channel bars riveted to two steel plates, forming a box column with all the rivet-heads outside. These columns were grouted into cast-iron sockets bedded in and bolted through the blocks of concrete. Cast-iron bumpers filled with cement-concrete protected the columns from injury from passing wagons. The normal span was 50 ft., but longer spans up to 98 ft. and shorter ones of about 30 ft. were required in some cases. Up to 75 ft. span, the height of the girders above the rail-level did not exceed the platform height, and plate-girders were used. In longer spans bow-string girders were used. Between the girders was fixed Hobson's arched-plate flooring, consisting of $\frac{5}{16}$ in. plates bent to a radius of 12 in., with a flat surface 6 in. wide on the top, riveted to intervening-T-bars, and made water-tight by asphalt run in the V-channels between the arches. The structure was so designed that the spans could be put together and riveted up with floor complete at one or both ends of the railway, and be then transported over the completed portion of the structure to be placed in position. A special form of erecting-machine was provided, consisting of two lattice-girders standing upon legs resting on the ground at the front end, and at the hinder end upon a carriage running on rails on the viaduct. These girders were placed at such an altitude as to allow the trolley carrying the succeeding span to be rolled along underneath them. On these lattice-girders were placed two travelling cranes, so arranged as to lay hold of the spans on arrival, run them forward, and deposit them in their permanent position upon the columns which had been erected in advance. The average time occupied by this operation was one hour per span. In the course of the work several opening bridges had to be provided which were described and illustrated in the paper, as were also the stations, permanent-way, and rolling-stock. The total quantity of iron and steel in the structure was about 22,000 tons. The total capital cost, including equipment and all other charges, had been £550,000, or about £90,000 per mile of railway. The line was formally opened by the Marquis of Salisbury on February 4, 1893, and was opened for traffic on March 6 following. The electrical system of working was completely successful, a five-minute service of trains being maintained with perfect regularity and without mishap of any kind. The second paper was entitled "The Electrical Equipment of the Liverpool Overhead Railway," by Mr. T. Parker, M.Inst.C.E.

Correspondence.

To the Editor of THE BUILDER.

BEVERIDGE HALL COMPETITION, KIRKCALDY.

SIR,—I am instructed by the Professional Practice Committee to enclose copy of correspondence which has passed between the Association and the Town Clerk of Kirkcaldy. It may interest your readers to know that so far back as December 23 last it was pointed out that the conditions were such as would prevent representative architects from taking part in the competition.—Yours truly, T. FAIRBAIRN,
Hon. Sec.

Edinburgh Architectural Association,
56, *Queen-street, Edinburgh*,
February 22, 1894.

CORRESPONDENCE BETWEEN THE TOWN CLERK OF KIRKCALDY AND HON. SECRETARY OF THE EDINBURGH ARCHITECTURAL ASSOCIATION.

I.—HON. SECRETARY OF THE E.A.A. TO THE TOWN CLERK OF KIRKCALDY.

W. ROY SPEARS, ESQ., *Town Clerk*, Kirkcaldy. — 56, Queen-street, Edinburgh, December 23, 1893.

SIR,—As instructed by the Council of the Edinburgh Architectural Association I beg to enclose Representation from them with regard to proposed Beveridge Hall, &c., competition, and to request that you will be good enough to submit it to the Committee as early as convenient.—Your obedient servant, (Signed) T. FAIRBAIRN.
Hon. Sec.

COPY REPRESENTATION REFERRED TO.

The Royal Institution, Princes-street, Edinburgh, December 23, 1893.

SIR,—A copy of the conditions laid down by the Provost, Magistrates, and Town Council of Kirkcaldy for the guidance of architects who may feel disposed to compete for the erection of the Beveridge Public Hall, Free Library, and Adam Smith Memorial Hall has been laid before the Professional Practice Committee of the Edinburgh Architectural Association, and with a request to examine the document and report to the Council of the Association thereon.

This they have done, and I am desired, in the name of the Council, who have carefully considered the report, to draw attention to three points in these conditions, which, in their opinion, are highly objectionable, and which they trust the Provost, Magistrates, and Town Council may see their way to amend.

These points are—

1. The amount of commission offered.

2. The power reserved to retain the three sets of designs for which premiums are offered, without employing the author of the first premiated set to carry out the work.

3. The absence of any provision for the engagement of a professional assessor.

As regards the—

1st. The amount of commission offered being 4 per cent. is one-fifth less than the commission recognised by the Royal Institution of British Architects and the other Architectural Associations in the United Kingdom, and the result will be that architects of standing, who conform to the rules of the profession, will be deferred from competing.

2nd. The absence of guarantee that the architect of the first premiated set of designs will be employed in the erection of the buildings is quite sufficient to prevent any competent practising architect from competing, as there is no inducement to him to spend time in preparing designs which may cost him the amount of the premium to prepare —possibly more—and so leave him without any legitimate reward for his labour.

The 2nd and 3rd sets should be returned to their authors, as no architect with any respect for himself would appropriate the work of another competitor. Presumably the premiums are offered as some compensation for the trouble the unsuccessful competitors have been put to, and not as representing the value of the designs. This being so there can be no objections to the said drawings being returned to the authors.

3. The absence of any provision for the engagement of a professional assessor will inevitably prevent many architects from submitting designs, as it is quite evident that however able and well-intentioned a lay committee of judges may be, there are many points, both technical and artistic, which can only be fully appreciated by an architect, who has made the study of planning and designing the business of his life.

It is observed that the total cost, including three halls, library, subsidiary buildings, boundary walls, architect's and measurer's fees, and clerk of works' salary is not to exceed the sum of twelve thousand pounds sterling (12,000*l.*). The council of the Association had not an opportunity of examining the extent and situation of the proposed site, but it occurs to them that the sum of 12,000*l.* will prove very insufficient for all that is stipulated for, especially as the buildings are to be of a monumental character. They have thought it right, therefore, to refer to this, so that your committee may not afterwards be disappointed.—I am, Sir, your obedient servant,

WILLIAM ROY SPEARS, ESQ., *Town Clerk*, Kirkcaldy. (Signed) T. FAIRBAIRN, *Hon. Sec.*

COPY, LETTER, HON. SEC., E.A.A, TO TOWN CLERK, KIRKCALDY.

W. ROY SPEARS, ESQ., *Town Clerk*, Kirkcaldy. — 56, Queen-street, Edinburgh, February 9, 1894.

Beveridge Hall, &c., Competition.

DEAR SIR,—I am directed to remind you that I have not yet been favoured with a reply to my letter of December 23 last regarding the above.—Yours faithfully,
(Signed) T. FAIRBAIRN,
Hon. Sec.

COPY, LETTER, TOWN CLERK, KIRKCALDY, TO HON. SEC., E.A.A.

T. FAIRBAIRN, ESQ., *Hon. Sec.* Edinburgh Architectural Association, 56, Queen-street, Edinburgh. — Town Clerk's Office, Kirkcaldy, February 10, 1894.

Halls.

DEAR SIR,—I have yours of yesterday, and also received yours of December 23. The Council have decided to adhere to the conditions of the competition. An Architectural Adviser, however, will be appointed.—I am, Dear Sir, Yours truly,
(Signed) W. R. SPEARS,
Town Clerk.

ORIENTATION IN ARCHITECTURE.

SIR,—In connexion with your leading article in your issue of February 17, will you allow me to add some further remarks to my letter of December 16? The investigation of the general question of the relations between architectural structures and the celestial bodies is evidently in the way of being considerably advanced in the course of the next few years. Obscure though the subject is, it is important and attractive by its very obscurity. Its importance appears to me to lie in the fact that the question has manifold bearings—it touches, perhaps, primarily, religion and related fields of psychology; it touches architecture and archæology; it touches astronomy and it touches chronology. In short, it promises to make no inconsiderable accession to our general knowledge of human progress.

But there is evidently a vast amount of work to be done in the way of actual observation and measurement, and in the critical discussion of conclusions, in order to determine what orientation will and what it will not explain, and to distinguish between intentional and conscious orieniations of the builders themselves and orientations which perhaps only modern theorisers have discovered. When this knowledge has been gained we shall have materially widened our views upon the signification of ancient monuments, the mental attitude of their builders, and the meaning of more than one point of modern ceremonial observance.

As yet the subject is all involved in obscurity, our ignorance is much greater than our knowledge. We have not, as I said, yet ascertained how much the ancients themselves intended and knew as to the orientation of their own constructions. To be candid, we ought to confess this frankly and keep it always in mind. We ought also to endeavour never to lose the guidance of common sense, nor, as your leading article warns us, allow ourselves to view a broad question only through our own particular spectacles.

I write this for no more special purpose than to help to draw the attention of your readers to the subject. That my former letter, with the exception of the kind explanations from Mr. Penrose, has led to no further correspondence is very possibly owing to the novelty and obscurity of the subject. I should like to take the opportunity of calling attention to the articles by M. H. Nissen, of Bonn, in the Rheinisches Museum für Philologe, to which Mr. Penrose alludes in his own Royal Society paper. M. Nissen's articles are a long series, and apparently not yet concluded. He handles his subject in thorough German fashion—that is, the papers are neither short nor superficial. At the same time they are not over-clouded with mysticism. The author deals first with the churches and temples at Rome, then with the Egyptian and Greek temples. Though he approaches the last-mentioned from a different point of view, he comes to one general conclusion at variance with Mr. Penrose's position; he says, with regard to their possible stellar orientation, that so far as his examination of the material goes, there can be no question of alignment towards stars during the earlier periods, though it may be proved, to a limited extent, for Hellenistic and Roman times. M. Nissen, therefore, contents himself with an attempt to derive the month-dates of the festivals. Mr. Penrose's attempt at a combined stellar and solar orientation is much more hazardous, and I must think it more interesting and suggestive than convincing or conclusive. I am still unable to assent to his general principle that the temples were directed to stars in order that the priests might know the time by them.

I am bound to say this appears to me far too trivial and practical a purpose to have controlled the laying-out of a sacred edifice. If we can accept this, we could equally accept Mr. Lockyer's position that the Egyptian Temples were primarily "star-pointers," the archetype of the modern astronomical observatory.

It would be safest to proceed simply from such broad underlying principles as that the heavenly bodies were for the ancients visible manifestations of divinities; that as temples were built as their abodes upon earth it was but natural to bring such buildings into relation with their abodes in the heavens, with the visible manifestations of their presence there; that if the purpose of the orientation was not actually liturgical, it was at least symbolical. The orientation of a Christian church is now, I suppose, merely traditional, a pure survival; possibly the orientation of an ancient temple was already little other than symbolical, seeing that the practice prevailed at the vastly more remote period of the great stone monuments.

I should have liked to refer to the difficulties of obtaining accurate measurements of orientations, but this letter is already over-long. I will conclude by quoting a couple of instances of indicated orientation from the Old Testament, which may have escaped notice. One is an allusion in the book of Job (xxxviii. 4, 5) to the Egyptian foundation ceremony of "stretching the cord": "Where wast thou when I laid the foundations of the earth? . . . who hath stretched the line upon it?" The other is in the description of the Tabernacle in the wilderness in Exodus xxvii., where the construction of the north, south, and west sides of the court are described, while the *east* is left for the entrance.

ENQUIRER

SURREY COUNTY COUNCIL SURVEYORSHIP.

SIR,—I read with interest your "Note" in this week's *Builder re* above matter. You only mention Mr. Bidder as having protested against the manner in which the whole matter was carried through.

I wish particularly to have it stated that I seconded his motion, and that his only other supporter was Mr. Roberts, of Richmond. I wish this, as I should be exceedingly annoyed were any one who knows me to suppose that I had allowed such gross neglect of the public interest to pass unnoticed. As a matter of fact, I was the first to call public attention to the matter on the Council at the November meeting, being supported on that occasion only by Mr. Roberts.

May I also say that while fully endorsing your remarks as to the impropriety under the circumstances of the chairman's giving his casting vote, I cannot but think that the point which I have all along commented upon is of even more importance —namely, the conduct of the special committee in placing Mr. Howell's name in the list of four candidates which they submitted for the final decision of the Council.*

This committee had before them testimonials from

* We had already commented strongly on this point, to the same purport as our correspondent, in a "Note" published at the time of the election of the Surveyor.—ED.

104 candidates, including most of the best men in England; on what principle could they pretend that Mr. Howell had any claim to be among the first four—or, indeed, the first forty? If he had been so brilliant in ability as to be justly entitled to preference to 100 other gentlemen, would he have remained all these years without having held some public appointment? As it was, men who had every qualification for the post, and who had held valuable and responsible public appointments, were passed over in his favour. Hoping you will kindly give me space to show that I disapproved most strongly of the proceedings of the Council, I will conclude by saying that I consider you have rendered a public service by your comments on the matter, and I feel bound to say that this election has, in my opinion, lowered the reputation of the Council in the eyes of the public, and that the whole affair is most unsavoury and discreditable.

OCTAVIUS HOLMES BEATTY,
Councillor for South Wimbledon Division.

NORTH WALES ASYLUM COMPETITION.

SIR,—Allow me to correct a statement that appeared in your last number in reference to the North Wales Asylum Competition. It was I who selected No. 10 for adoption, and the committee loyally endorsed my choice. According to the terms of the competition the committee reserved to itself the power to select any of the four placed by me.

ED. SALOMONS, F.R.I.B.A.

"BLIND-STORY."

SIR,—In your account of the Scottish Cathedral of Dunkeld, I fail to notice any mention of the fact that the "Fasti" of that church, as given by Abbot Mylne, preserve one of the very rare instances, if not the sole example, of the use of the term "blind-story"; for what, by a limitation of a term originally of much wider reference, is now universally known as the "triforium." More than half-a-century ago I lighted on the passage, and sent it to my valued friend, Mr. J. H. Parker. By him it was inserted in the next edition of his "Glossary of Architecture," and thus the term "blind-story" became known. It was adopted by the late Mr. Edmund Sharpe, and employed by him extensively in his architectural publications. But it has never, I think, taken hold of the popular mind, and it is now, I think, seldom met with. The appropriateness of the term "blind-story," however, as opposed to "clearstory"—the range of windows which you *cannot* see through and those you *can*—is so evident that one may regret that it ever dropped out of use, and that it has not been more extensively revived.

The passage occurs in Mylne's "Life of Bishop Cardeny," by whom the existing nave of Dunkeld Cathedral was begun, and carried up to the clear-story string. It is as follows (p. 16):—"Fundavit navem ecclesiæ suæ Dunkeldensis die XXVII. Aprilis, A.D. MCCCCXLVI., et construxit usque secundos arcus *vulgariter "le blynd storijs."*

May I add that I was rather surprised to find that attention was not drawn in your article to the very singular and probably unique character of this triforium or "blind-story" range. As will be seen from the illustrations there given, it consists of a series of semi-circular arches, rising at once from the horizontal string-course above the nave arcade, without any shafts—for which, indeed, there is no room—just the arched heads of an ordinary triforium range cut short. Each arch is subdivided by two half arches rising from the centre of the base line, forming, with the intercepted portion of the circumscribing semi-circle, two pointed arches. The spandrel formed between them above is trefoiled. The arches themselves are plain. The effect of this long row of semi-circular openings cannot be said to be pleasing. Can any of your readers mention a similar example? And can anyone supply another instance of the Mediæval use of the term "blind-stories?" From the word "vulgariter" employed by Mylne it would seem to have been in common use in the architectural nomenclature of the Middle Ages.

EDMUND VENABLES.

The Precentory, Lincoln, February 26.

HEREFORD CATHEDRAL.

SIR,—Having lately visited Hereford Cathedral, will you permit me to make a public protest against the misuse of a portion of the cloisters *as a coal store*.

When one sees that a few years ago thousands of pounds were expended under the direction of a popular architect of that day in the erection of mere internal decorative (and tawdry-looking) ironwork screen and candelabra, surely the cathedral authorities might devote a few pounds now out of their funds to the structural preservation of these cloisters by the erection of a harmless necessary coal store-house.

It does seem so sad, so "Philistine" in the worst sense of that word, that these cloisters, intended by those who built them for the meditations and peaceful sanctuary, in troubled and ignorant times, of pious and learned men, should be thus desecrated by us, their descendants, who, at the end of the nineteenth century, claim to be the heirs of all the learning of all the past ages.

And it is such a mockery to see a begrimed and sooty tombstone or wall tablet stating that it is "Sacred to the Memory" of those who rest below, these monuments having been placed there in the mistaken confidence of those who mourned for the departed that within these sacred precincts they would for ever rest in peace.

February 26, 1894. PERCY HUNTER.

The Student's Column.

THE STRUCTURE AND PHYSICAL PROPERTIES OF BUILDING STONES.—IX.

STRUCTURE—GENERAL CONSIDERATIONS.

THE structure of building stones may be treated from three standpoints.—(1) Their appearance to the naked eye when seen at the distance of a few feet; (2) their general characters when viewed with a pocket lens; and (3) their structure under the microscope.

An examination by the first-mentioned method frequently reveals important facts unobtainable by either of the others. A fine-grained stone presenting surface characters which would cause it to be passed as an excellent material as judged from inspection of hand specimens, or samples only, frequently on examination of the stone in bulk leads to the conclusion that it is comparatively worthless—or, at any rate, only of inferior quality. It may be that on the large scale it develops "clay pellets," or soft places, which weather out, forming holes, almost immediately after the building is erected. Or, on the other hand, hard concretionary patches here and there occur, materially interfering with the economical working of the stone, especially when converted by machinery. Minute discoloured cracks, lined by soft ferruginous earth, often very local in their occurrence, or hard veins of mineral matter, much harder than the stone through which they run, are particularly common in the softer freestones. Irregular bands of shelly matter, alternating it may be with courses of large and small particles, are features conspicuous in certain shelly limestones. The phenomenon of "false-bedding," however interesting to the geologist, has but little attraction for the architect seeking a homogeneous material. In too many instances the false-bedding is accompanied by changes in tint of the material, and prominent rusty-looking lines, running over the surface of the stone in every conceivable direction, are the inevitable result. The effect, viewed, say 100 yards away, is not bad, and agrees pretty accurately with the circulars wherein such stones are sometimes described as of "golden," "warm orange," "auburn," &c., tints.

Speaking of the connexion between structure and colour of stone reminds us that, in a general way, any serious modification in structure is almost always accompanied by a corresponding change in tint. We may enlarge on this for a moment. Summarising the prevailing colours of building stones and the causes thereof,* it may be stated that—

White usually indicates the absence of heavy metallic oxides, especially iron.

Black may be due either to the presence of carbon, or to some iron oxide, or silicate rich in iron.

Yellow almost always indicates the presence of hydrated peroxide of iron.

Brown very generally, on weathered surfaces, points to the oxidation and hydration of minerals containing iron.

Red is mostly due to anhydrous peroxide of iron, and varies in intensity from dark blood-red to pale flesh-coloured tints.

Green in crystalline rocks is chiefly owing to the presence of hydrous magnesian silicates; and in sedimentary rocks principally to ferrous silicate.

Sir Archibald Geikie remarks that the mottled character, so common amongst many stratified rocks, is frequently traceable to unequal weathering, some portions of the iron being more oxidised than others; whilst some, on the other hand, become deoxidised from the reducing action of decaying organic matter. To the latter cause may be attributed the circular green spots so often found in red stones.

Interference with the normal tint of stones is very noticeable in the vicinity of large fossil shells, or small patches of the same, especially in sandstones. The immediate neighbourhood of the shelly matter is nearly always more damp than the non-shelly portions of the stone; it would seem as though the foreign substance had attracted the moisture to it, so to speak, and the continued chemical action induced in the extra-saturated portion when the stone is built up, tends to render that part of it lighter than the remainder. Precisely similar effects are produced in the vicinity of small concretions, so prevalent in many building stones; the structure of the material round about them is altered by decay, and the whole becomes softer. The concretions themselves in certain oolites are light blue, whilst the stone generally is cream-coloured.

An interesting case, in which the passage of moisture was hindered by the presence of veins of calcite, came under our observation at some of the Bath stone quarries not long since. This peculiarity of structure is noticeable in many oolites along the same geological horizon, and at once attracts attention in newly-quarried blocks, or after a smart shower of rain. The prevalent veins were mostly vertical or horizontal, and in blocks where several such occurred in parallel series we noted that their general effect was to hold up the moisture, and where the veins were horizontally disposed, a wet zone occurred above, and a dry zone below each vein. Under certain circumstances these veins must, therefore, act as damp-courses in buildings.

Igneous building stones—granite and the like—present many peculiar features in structure when viewed a few feet away that would be altogether lost sight of in a hand specimen, or in micro-examination. Some Scotch granites, for instance, are roughly foliated, the mica especially having a tendency to follow definite planes, more or less parallel with each other. This structure becomes the more apparent as the material is polished, and its effect in columns is not altogether pleasing, in addition to which they must be, to some extent, planes of weakness. An otherwise even-structured granite is sometimes varied by the development of remarkable local patches, which in this case, however, do no harm to the material so far as its weathering is concerned, although unsightly from an artistic point of view. In certain thoroughly-crystalline rocks, variously tinted zones—mostly lighter than the bulk of the rock—occur; though these may be barely perceptible until the stone is polished. Minute "blind" cracks are frequently developed; caused, it may be, by natural means, or during the blasting operations consequent on quarrying. These should be carefully sought for in looking at the material. It is impossible to appreciate the real structure of such rocks as coarse-grained Cornish granite without viewing the stone in bulk. When the rock is porphyritic a hand specimen fails to convey any idea of it as a whole.

The manner of fracture, so essential in the production of "rustic face" work, and many other points connected with tooling or masoning, can only be judged to advantage in the quarry or stone-mason's yard. Marble cannot, as a rule, be selected from samples, either for effect of colour or evenness of polish.

Turning now to the second method of examining structure alluded to—that of viewing building stone with a lens—it may be said that the prime object gained is the ready detection of pyrites and other deleterious minerals in the stone. We also get a broad insight into the mode of disposition of the crystals (or particles, as the case may be) with reference to each other, providing the grain is not too small. To a limited extent the state of crystallisation then becomes apparent; whilst it enables us at a glance to determine the majority of the chief varieties of stone. The microscope cannot be carried into the field, and if it could, would be of comparatively little use, as we shall presently see, and the lens is a good substitute therefor in many respects. Hair-like cracks, invisible to the naked eye, but which become painfully obtrusive when the stone is built up, are easily seen with a pocket lens. In the case of oolites the condition of the granules can be better seen than when under the microscope, and the relative abundance of foreign matter can be well made out.

The third-mentioned method of investigating structure is, however, by far the most important and searching—the examination by aid of the microscope. The particular kind of microscope required for the work, together with the optical properties of a few common rock-forming minerals, will be described in our next article. We may now mention, however, that for the purposes of

* Based on data given by Geikie, "Text-book of Geology," 1882, p. 92.

the investigation it is necessary that slices of each stone shall be ground down so thin as to render them practically transparent. The mode of preparing these sections was fully described in these columns on a former occasion,* and need not be further referred to. Every common mineral has distinctive optical properties when seen in transmitted light; and by these alone can they be satisfactorily determined. The presence or absence of matrix in a fine-grained stone; the relationship that the crystals or particles, however small, bear to each other; their state of preservation or decay; and a hundred other points tending to elucidate apparent anomalies in their behaviour under certain conditions, may be resolved on appeal to the microscope. By its means alone is the chemical composition of building stone rendered intelligible; but the use to which we shall specially put the microscope is in the identification of building stones which closely resemble each other in outward appearance. That phase of its utility has never been treated of before.

OBITUARY.

PROFESSOR SOMMER.—We regret to announce the sudden death of Professor Oskar Sommer, at Frankfort-on-Main. Born in 1840, at Wolfenbüttel, he studied first at the Polytechnic of Hanover, and then under Semper, at Zurich. After taking part in the competition for the façade of the Cathedral at Florence, he resided at Berlin until 1869, when he was appointed Lecturer on Architecture at the Staedelsche Institute at Frankfort, a post which he retained until his death. He was the designer of a number of public buildings at Frankfort, amongst them the Staedelsche Institute and the New Exchange (the latter in conjunction with Bümitz). He was responsible for the general plan of the Frankfort Electrical Exhibition of 1891, of which he was one of the most active promoters.

GENERAL BUILDING NEWS.

POLYTECHNIC INSTITUTE, BATTERSEA.—On the 24th ult. the Prince of Wales opened the new Polytechnic Institute which has been erected in the Battersea Park-road. Physical and chemical laboratories, photograph, art, and music-rooms, with numerous class-rooms and lecture-halls, have been arranged in this new building, which is capable of accommodating at one time 1,450 students. The architect is Mr. E. W. Mountford. The building has been described and illustrated in our issues for March 28, 1891, and July 23, 1892.

BANK PREMISES, BRADFORD.—New premises for the Yorks. Penny Bank have been erected in Bradford at the junction of North Parade and Manor Row, from designs by Mr. James Ledingham, architect, of Bradford.

NEW TECHNICAL SCHOOL FOR HEYWOOD.—On the 24th ult. Alderman Healey laid the memorial stone of the Heywood Corporation Technical School, which is in course of construction on the Town Hall site, Heywood. The school is being built by Messrs. Blakeley & Bell, contractors, of Hopwood, Heywood, from the plans and designs of Messrs. Woodhouse & Willoughby, architects, Heywood, and it is estimated that it will provide accommodation for nearly 1,000 students. The style of the building is Renaissance, freely treated. The structure will be three stories in height. The basement floor will comprise a weaving and spinning room, weaving class-room, engineering workshop, plumbers' room, and carpenters' chamber. The ground floor will contain a science lecture-room, whilst the whole of the top story will be devoted to the study of chemistry and art. Externally the building will be faced with Henry Dennis's Ruabon red stock bricks. The window heads and sills will be of stone, but the remainder of the dressings and all other enriched work will be executed in Ruabon terra-cotta. It is estimated that the school will cost about 7,000*l.*

ORPHANAGE, LEEDS.—The Walmsley Orphanage in connexion with the Brudenhall-road Mission Hall, Leeds, was opened recently. The building is constructed in the Domestic Gothic style, built of brick with Apperley stone dressings, and has in the centre a tower. On either side of the entrance is a square bay window, mullioned windows above, with dormer windows on the third floor. The first floor comprises an entrance-hall, visitors', children's, and matron's rooms. On the second and third floors are dormitories, bedrooms, a linen room, bath rooms, and lavatories. The dining, kitchen, pantry, scullery, store-room, &c., are on the ground floor. A playground adjoins the building, and Messrs. Walmsley's workmen have erected the home from plans prepared by Mr. D. Dodgson, architect, Leeds.

CONDITION OF CHESTER CATHEDRAL.—We understand that the damage done to Chester Cathedral by the recent gale is more serious than was anticipated. The Dean and Chapter have called in Sir A. Blomfield, and, acting on his advice, have decided to make the exquisite groining of the inner roof of the Chapter House, on which a dislodged pinnacle fell, more secure, and also to complete the western gable and roof, as Sir Gilbert Scott had advised. The necessary work will entail the expenditure of about 1,000*l.*

WESLEYAN CHAPEL, READING.—A new Wesleyan chapel was opened recently at Reading. The interior of the chapel is 60 ft. by 44 ft., with a lofty arched ceiling, divided by moulded ribs into panels, which are decorated. The galleries on either side and over the entrance are fitted with pitch-pine seats, the whole, including the ground-floor, being capable of seating about 700 persons. The organ-loft and choir gallery at the south end are of the same material, the arch being enriched and supported by two stone columns, with carved capitals. A special feature in the chapel is the rostrum, with staircase on each side. The galleries are approached by two stone staircases, connecting and opening into the lobby and vestibule, which are tiled at the front entrance. There is also a rear staircase, admitting of the Sunday-school children passing from the school buildings direct to the chapel; access is also gained from this staircase and entrance to the choir gallery. The chapel and schools, &c., were designed and executed by Mr. F. Boreham, architect, London, and the contract for the completion of the whole of the works in connexion with the chapel was carried out by Mr. Samuel East, builder and contractor, of Reading. The heating apparatus, on the high-pressure system, was supplied and fixed by Messrs. Vaughan & Brown, engineers, of London. The cost of the building, exclusive of the purchase of the land, is about 4,500*l.*

SCHOOL BOARD OFFICES, KEIGHLEY.—Offices for the Keighley School Board have been erected in Cooke-street and Lawkholme-lane, Keighley, from the designs of Mr. James Ledingham, architect, of Bradford.

NEW PREMISES, NATIONAL DENTAL HOSPITAL, GREAT PORTLAND-STREET.—The Duke of York, as President of the National Dental Hospital and College, opened on the 24th ult., the new premises of that institution in Great Portland-street, Oxford-street. The new building is of red brick. The various departments include a stopping room for the accommodation of seventy-five patients, special demonstration rooms, a lecture hall, and laboratories. Mr. A. E. Thompson is the architect of the building, the cost of which is understood to have been between 9,000*l.* and 10,000*l.* The various works of heating, ventilation, hot-water supply, and gas services, have been carried out by Messrs. Russell & Co., 42, Berwick-st., Oxford-street, W. The heating is on the low pressure system, with radiators and coils in the various halls, laboratories, and rooms. The hot-water supply to the staff and students' lavatories in the extraction and stopping rooms is worked conjointly from the range and from a special hot-water supply apparatus fixed in the stokery. For the ventilation two main extraction flues have been formed in the building, with cast-iron flue pipes from stokery carried up in each, into which flues from the various rooms are carried.

PROPOSED GAMBLE INSTITUTE, ST. HELEN'S.—As many of our readers are aware, it is proposed to erect at St. Helen's a new institute, the outcome of an offer of 20,000*l.* and a piece of land containing 1,500 square yards, made by Colonel Gamble, C.B. The committee appointed to carry out the scheme received about thirty sets of plans from various firms of architects in the country, and Messrs. Briggs & Wolstenholme, of Blackburn, were ultimately selected as architects to the committee. Their original plans showed a building four stories high, in addition to basement, but it was found that the erection of such a building would cost more than 20,000*l.* The architects thereupon prepared new plans for a three-story building, with basement. The main entrance to the building is from Hardshaw-street. The free library will occupy the whole of the ground floor, and be raised about 7 ft. from the street level. The entrance will communicate with a hall, behind which will be the lending department, capable of accommodating 40,000 vols., and divided from the hall by a counter 60 ft. long. The whole of the frontage to Bickerstaffe-street will be occupied by the newsroom—114 ft. by 32 ft.; while the reference library—52 ft. by 32 ft., boys' reading-room—32 ft. by 20 ft., and girls' reading-room—32 ft. by 18 ft., will occupy the opposite wing. A private room for the librarian is placed between the reference and the lending departments. The entrance to the Technical School will also be from Hardshaw-street, and will correspond with the entrance to the Free Library, they being situated on each side of the central staircase. The technical director's office and waiting-room are arranged for on the ground-floor level, communicating directly with the Technical School staircase and the hall of the Free Library. The porter's room is arranged between the two main entrances overlooking the staircase of the Technical School and the hall of the Library. The basement floor will be devoted to the manual training-room, building class-room, metallurgical laboratory on the Bickerstaffe-street side, with the plumbing class-room and engineering laboratory fronting Corporation-street; teachers' room, cloak-rooms, &c., to Hardshaw-street. The centre of the basement floor will be occupied by a book-store in connexion with the library, and will communicate directly with the ground floor by a private staircase, and also have a small lift for books. A feature of this plan is a covered cartway in Bickerstaffe-street, through which all building material, library, and other stores, and coals will be taken into the building. The rear portion of the cellar is devoted to the warming and ventilating plant, and is separated from the engineering laboratory by glazed screens. It will be lighted from the open space behind the adjoining houses. From the basement floor to the street level and upward to the first and second floors a staircase is provided. Off a mezzanine landing between the ground and first floor the keeper's rooms will be placed. On the first floor, next to Bickerstaffe-street, will be provided the physics laboratory, dark room, and store room; the physics lecture room, with the seating on the amphitheatre plan to accommodate ninety students; preparation room, and two large class-rooms. The wing to Corporation-street on this floor will embrace students' common room, two class-rooms, and the geometrical-drawing room. On this floor will also be placed the cookery and laundry departments, which are so designed that the whole area, 56 ft. by 32 ft., can be used as one room for large demonstrations. A teachers' room, lavatory, &c., and the male students' cloak-rooms will occupy the irregular piece of land on each side of the main stairs; by this the site, though irregular, is used to its fullest capacity, while all the working-rooms are square or symmetrical in form. A feature of this and the second floor landing will be an arcading dividing the same, which may be filled with glazed screens, thus providing a museum for the preservation of prize exhibits or other articles of interest relating to the work carried on in the Institute. The second floor will be entirely devoted to the chemical and art departments, the chemical laboratory (for sixty students—63 ft. by 32 ft.), balance and combustion rooms, the lecture theatre (to seat ninety, the same as the one on the first floor), and preparation-room occupy the whole wing to Bickerstaffe-street. The modelling, painting, and art masters' room and office are placed in the north lighted wing, facing Corporation-street. The elementary art room—56 ft. by 32 ft.—lighted from both sides, occupies the rear position, the front being reserved for teachers' rooms, ladies' lavatory, &c. The building will be lighted by electricity supplied from the Town Hall. It will be faced externally with red pressed bricks and terra-cotta. The staircase and corridors will be fireproof, the latter being laid in wood blocks, and both having tile dados on the walls. There will be a lift communicating from the basement to the top floor of the building.

SANITARY AND ENGINEERING NEWS.

SEWERAGE SCHEME, CHESTER-LE-STREET UNION.—The Rural Sanitary Authority have adopted a scheme of sewerage and chemical precipitation tanks for the village of Alma, Pelton; and also sewerage works for Pelton Grange, Blamish, according to plans prepared by Mr. D. Balfour, M.Inst.C.E., F.G.S., Newcastle. The authority approved of the completion of the sewerage and sewage disposal works for Birtley and Edmondsley, and instructed Mr. Balfour to arrange for their now being put into full working operation.

DRAINAGE OF BURTON SALMON AND BROTHERTON.—On the 13th and 14th ult., Colonel W. M. Ducat, R.E., held Local Government inquiries at these places respectively into the applications promoted by the Pontefract Rural Sanitary Authority for provisional orders for acquiring lands compulsorily from Sir J. Ramsden, of Byram Hall, for the purpose of sewage disposal. Sir John Ramsden opposed in respect of the particular lands scheduled, but offered other lands in substitution of the same. Mr. Malcolm Paterson, M.Inst.C.E., the Engineer for the schemes, stated that he had no engineering objection to raise against the adoption of the lands suggested by the owner, but thought that in both cases they might be considered open to objection by adjoining owners and occupiers, as being too near the respective villages, and in fact this objection was raised in the case of Brotherton by certain ratepayers, including the vicar. The inspector, however, thought the alternative sites suitable, and they were accepted by the Clerk to the Authority, subject to the sanction of the Local Government Board, an assurance being distinctly given by Colonel Ducat that the application for the provisional order would not be prejudiced by this course.

DRAINAGE SCHEME, OUGHTIBRIDGE, SHEFFIELD.—The Wortley Union Rural Sanitary Authority having proposed to carry out a drainage scheme for Oughtibridge, instructed Mr. D. Balfour, M.I.C.E., F.G.S., of Newcastle-on-Tyne, to report on the same. At a recent meeting of the Authority, Mr. Balfour presented his report, which embraced alternate schemes, either by disposing of the sewage, by means of chemicals and land, or conveying it to Wadsley Bridge, thence into the main sewers of the Corporation of Sheffield for delivery and disposal. The sewerage of the South Yorkshire large Asylum is also provided for. The question was adjourned till next meeting, the report to be meantime printed.

SEWAGE DISPOSAL AT WALSALL WOOD.—Major-General H. Darley Crozier, R.E., Inspector

* The *Builder*, vol. l. (1886), p. 658.

of the Local Government Board, recently conducted an inquiry as to the application of the Local Board for permission to acquire a piece of land belonging to the trustees of the late Mr. Earp, for a sewerage scheme for Walsall Wood, and for leave to borrow 10,000*l.*, the estimated cost of the scheme. The population of the district to be dealt with is 13,703, Of the 2,514 houses, 2,075 are of less than 10*l.* a year value. It was stated that four sets of the plans had been obtained, and on the recommendation of the Surveyor to the Board those of Mr. Nicholls had been selected. That plan would be sufficient for a population of 60,000 persons. The main outfall would be at Shelfield Farm. The system adopted was that of the International Purification Company, and the sewage would be conveyed by gravitation. The plan was capable of enlargement so as to provide for an additional 50 per cent. of population, the present cost being estimated at 7,758*l.* 13. Mr. Alfred Young, for the opponents of the scheme, submitted that it would injure his clients' land to the extent of 5,000*l.*, and that the land proposed to be taken was quite unsuitable. He called Mr. Wilcox, engineer, who had sent in an alternative scheme; Mr. G. Matthews (Birmingham), Mr. G. Brown, C.C., and Dr. Hill. The evidence of these witnesses was that the land was of a clayey peat subsoil, with only a thin surface of earth, and full of water at a depth of about 3 ft. They also stated that it would not give sufficient flow to the effluent from the tanks.

NEW WORKS AT BARRY.—According to the *Western Mail*, the engineers' estimates for the construction by the Barry Railway Company of the new railways and other works proposed in their deposited Bill for next session have been prepared, in accordance with the requirements of Parliament. The total cost of the whole of the new works contained in the Bill is set down at £102,232, of which £100,032 is estimated to be required for the two new railways, and £2,200 for the embankment or breakwater, extending from Yorke Rock at the western extremity of Barry Island for a distance of seven chains over the foreshore. Of the total sum required for the railways £70,032 is set down as the cost of the proposed new line, 2 miles 1 furlong 5·8 chains in length, commencing by a junction with the company's main line 18 miles from Barry, and terminating at a point near the Cymmer Colliery, in Llantrisant. The 30 acres of land required for this line are estimated to cost 13,720*l.*, and the other items of expenditure are as follow:—Cuttings through 215,000 cubic yards of rock and soft soil, 17,750*l.*; tunnels, 6,045*l.*; retaining walls, 1,000*l.*; culverts and drains, 1,250*l.*; one bridge, 600*l.*; accommodation bridges and works, 4,000*l.*; laying down permanent way at 4,800*l.* per mile, 10,548*l.*; permanent way for sidings and cost of junctions, 2,000*l.*; stations, 8,000*l.*; and contingencies, 5,119*l.* From the estimates for this line, which are signed by Mr. James Bell, C.E., it appears that this railway will be a double line throughout. For the proposed railway, 6 furlongs 7 chains in length, from a point near Barry Station to a point near the junction of Ivor-street with Plymouth-road, Mr. J. Wolfe Barry, C.E., estimates that the sum of 30,000*l.* will cover the whole cost of construction, of which 14 acres 3 roods 7 perches of land required for the line will absorb 1,800*l.*; cuttings through soft soil, 14,021*l.*; two bridges, 3,300*l.*; culverts and drains, 1,550*l.*; pitching slopes, 500*l.*; permanent way, 4,268*l.*; stations, 2,000*l.*; and contingencies, 2,561*l.* This railway will also be a double line throughout.

NEW BRIDGE, WOOLER, NORTHUMBERLAND.—A new iron bridge across the Wooler Water has been opened for traffic. The engineers were Messrs. J. Watt Sandeman and Moncrieff, MM.Inst.C.E., Newcastle, and the contractors were the Stockton Forge Company. The main girders are of the bow-string type, the entire structure being of mild steel and capable of carrying a 20 ton roller. The clear span is 80 ft., and the roadway has a clear width of 15 ft. The flooring consists of cross and longitudinal girders, covered by buckle plates. The foundations are of concrete, and the abutments are of snecked rubble masonry, the stone being obtained from a local quarry. The bridge has been built to satisfy the requirements of the County Surveyor, Mr. H. S. Kynnersley.

SEWERAGE WORKS, ASHLEY DOWN, NEAR BRISTOL.—At a recent meeting of the joint committee, consisting of representatives from the Horfield Local Board and Barton Regis Rural Sanitary Authority, appointed for the purpose of dealing with the sewerage and sewage disposal of the respective districts governed by the above boards, it was reported that the assent had been given of the Local Government Board to the scheme over which an inquiry had been held by Colonel Ducat, in the previous month. The Local Government Board had approved of the whole scheme without any modification. The engineer, Mr. A. P. I. Cotterell, C.E., was instructed to at once go forward with the preparation of the necessary plans.

ENGINEERING WORKS, ABINGDON UNION WORKHOUSE.—New boilers and appliances for cooking, laundry purposes, and heating the union workhouse by steam, have recently been carried out by Messrs. Wood Brothers, of Brockly, from plans and specifications prepared by Mr. George Winship, A.M.Inst.C.E., of Borough-buildings, Abingdon. The scheme provides for the fixing of radiators in the several wards, boiling-pans and steamers in the kitchen, and the usual provisions for the laundries. The cost has been about 1,000*l.*, and the saving will be upwards of 100*l.* per annum.

FOREIGN AND COLONIAL.

FRANCE.—During the present session of the Municipal Council of Paris, consideration is to be given to the provision of underground conveniences for Paris, similar to those recently carried out in London.——A crematorium, similar to that at Père Lachaise, has been constructed at Grenoble.——An exhibition of Decorative Art is to be held at Nancy on June 14, to remain open a month.——A society "for promoting the culture of the Arts," has been formed at Aix, in Provence, in imitation of the society presided over by M. Louis Gautier.——A rich merchant of Marseilles, M. Moricelly, has given a million francs to the town of Carpentras for the construction of a Hôtel de Ville.——A subscription has been opened to raise a monument to Cardinal Lavigerie in the Cathedral of Carthage.——The death is announced, at Gennevilliers, of the painter Gustave Caillebotte, one of the most ardent promoters of the Impressionist movement. His *début* in eccentric painting made some sensation about fifteen years ago; but he had retired from the field, and made no further appearance in exhibitions for some time past, though only forty-six at the time of his death.——Last Sunday a strategic railway line with narrow gauge was opened from Brest, connecting the port of Brest with the estuary of Aber Vrac'h, one of the most important points of Brittany, and a frequent rendezvous for the torpedo-boat flotilla.——The town of Montpellier has opened a competition for the artistic decoration of eight panels in the Municipal Theatre.——A society has been started in Paris for founding a "Musée Religieux," the date of opening of which, however, is not yet fixed.——The General Committee for the 1900 Exhibition has notified that it is indispensable, for the arrangement of the Exhibition on the Esplanade des Invalides, that the intended station at this point (the terminus of the line from Moulineaux) should be covered over in such a manner of construction that temporary structures may be erected on the top of it; and that the line itself must be kept 6·50 mètres below the pavement level of the Quai d'Orsay.

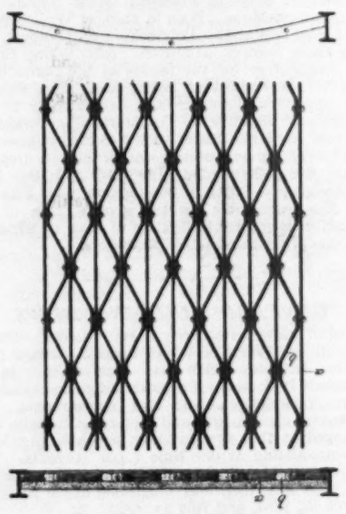
SWITZERLAND.—At a recent meeting of the Zurich Society of Engineers and Architects, M. Waldner, editor of our contemporary, the *Schweizerische Bauzeitung*, was elected president, and M. Metzger vice-president. A commission, consisting of six architects and sixteen engineers, was appointed to ensure the proper representation of the society at the Swiss national exhibition to be held at Geneva in 1896.

BELGIUM.—The Belgian Government has recently appointed M. A. J. Wauters to be one of the members of the executive committee of the Royal Galleries of Painting and Sculpture. M. Wauters is known best in this country by his "History of Flemish Painting"; his last work, which was published on January 1, treats of the work of Hans Memlin, and has aroused much interest, owing to the author's discovery of a hitherto-unknown masterpiece at the monastery of Najera, in the north of Spain, in merit second only to Memlin's known works at the Hospital of St. John at Bruges. It is also shown in this book that Memlin was not, as has hitherto been supposed, a Fleming by birth, but was born at a little village near Mayence. M. Wauters is not only an art critic but a great traveller and geographer; he is Secretary-General of the Belgian Industrial Companies of the Congo, and editor of the "*Mouvement Géographique*" and of the "*Congo Illustré*," as well as the author of several works on Central African matters.——The next archæological Congress will take place in June at Mons, under the presidency of General Wauwermans.

GERMANY.—The "Arts and Crafts" exhibits from the North American section of the Chicago Exhibition, which were purchased by the Prussian Government, are now being shown at the Arts and Crafts Museum at Berlin. The exhibits comprise furniture, silver, glass, carpets, basket-work, tools, iron-work, locks, and a remarkably complete collection of electric-lighting arrangements.——The colleagues and pupils of Professor Ernst Curtius, lecturer on Greek Archæology at the Berlin University, intend to commemorate his eightieth birthday, which falls this year, by erecting his bust in the museum at Olympia. The Greek Government have readily given the required permission, seeing that the success of the excavations at Olympia is in a great measure due to his efforts.——The names of the members of the "hanging committee" of this year's Berlin Art Exhibition are now published. Herr H. Grisebach is the architectural representative.——Professor Dumichen, the well-known Egyptologist, has died at Strasburg, at the age of sixty-one. He was the author of a number of works on ancient Egyptian buildings and inscriptions. His work on the Temple of Denderah is, perhaps, best known.——The annual Art Exhibition at Munich will be held this summer as usual. In the invitations sent out the committee draw attention to the fact that exhibits are to be limited to "personal production in its most noteworthy form," as these annual exhibitions are assuming a too extended character.——The municipality of Munich has been enriched to the extent of 1,000,000 marks under the will of Engineer Karl Müller; the amount is to be used for the erection of public baths in that city.—The Government of Baden has decided to erect an observatory on the Gaisberg, near Heidelberg. An American lady has given 2,000*l.* towards the purchase of the necessary instruments.——The ruined chapel of the Moritzburg is to be restored in commemoration of the two-hundredth anniversary of the foundation of Halle University. Funds are at last forthcoming for the erection of the statue of Richard von Volkmann, the renowned surgeon, which is to be set up at the entrance to the surgical schools.

MISCELLANEOUS.

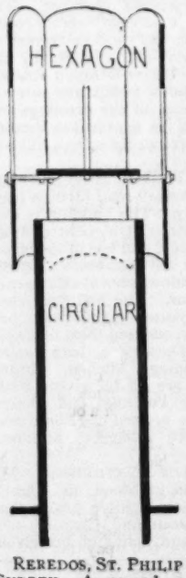
CONCRETE AND IRON CONSTRUCTION.—The annexed cut represents a form of light wrought-iron frame patented by Herr Dedreux, of Munich, for the embedding in concrete, either in floors or partitions. The iron is in three pieces placed on edge in the framework, which can be made to measurement at the manufactory and sent into the



Dedreux' Iron-Framing for Concrete Partitions

building ready to be fitted in its place. We are quite willing to draw attention to it, as it has been brought under our notice specially, but do not see that it is superior to some other combinations of steel or iron and concrete which are already in use in this country. It is being largely used, we understand, in Munich.

PROPOSED REREDOS, SWYMBRIDGE CHURCH, DEVONSHIRE.—It is proposed to erect a reredos at Swymbridge Church in memory of the late Mr. J. Smith. Messrs. Harry Hems & Sons, Exeter, have the work in hand. It will be of the same character as the main architectural feature of the church itself, and will be made wholly of polished marbles and alabaster of bright warm colour. The groups of statuary which will fill the panels and niches will be of pure white Castellino marble



THE "EAGLE" CHIMNEY-TOP.—This chimney-top, of which a section is shown, is specially to prevent down-draught. The construction will be easily understood by the section. The circular chimney-pipe stands up 6 in. within the hexagonal case; 6 in. above the pipe-top is a disc of a diameter 1 in. greater than the pipe, and about 3 in. less than the case. This disc works up and down in the slots (of which there are three) to admit of the sweep's brush passing right through the pipe. With specially troublesome chimneys the disc can be set at any height over the pipe that gives the best results. It does not then give way to the sweep's brush. The chimney-top is made and patented by the Eagle Range and Foundry Company.

REREDOS, ST. PHILIP CHURCH, CHEAM COMMON, SURREY.—A carved oak reredos, with shutters

and panelled wings, has been presented to this church, forming memorials to two parishioners. The reredos proper contains paintings as follows: In the three centre panels, the Supper at Emmaus, and on the shutters, two on either side, figures of St. Philip, the patron, and St. Dunstan, the patron of Cheam, and on the two outer ones foliated designs carrying the arms of Canterbury and Winchester, all on grounds of gold and diaper. These paintings are the work of Mr. N. H. J. Westlake, F.S.A. The wings contain linen panels of elaborate and varied character, above which is carved a series of shields bearing the implements of Our Lord's Passion. A richly-moulded arcade of nine arches resting on the altar-shelf, a single block of Irish green marble, supported on moulded red Corsehill corbels, sustains the central portion of the reredos, which is a fixture. Both the reredos and wings have inscriptions in Lombardic capitals. The oak work and carvings are by Mr. N. Hitch, of Vauxhall, the whole having been carried out from the designs and under the personal supervision of Mr. E. Swinfen Harris, architect, of London.

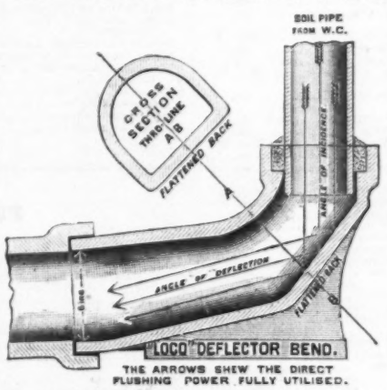
ANOTHER REVERSIBLE WINDOW.—In reference to our note last week on a window-cleaning safeguard, when we remarked that reversible sashes were probably the best expedient, Messrs. Gray & Batstone, of Egham, have sent us a model of one which has a good deal of merit for simplicity and economy. The rebate or groove in which the sashes work is made on one side of the window a good deal deeper than on the other, and the sash kept as tight as is required by screws passing through it parallel with the plane of the glass, and which press against a plate in the side of the sash. By screwing them up tight the pressure can be increased so as to render the sashes immovable, and this is the method of securing them, no form of latch being required. This pressure of the screws will also prevent the sashes from rattling in a high wind. When, on the other hand, it is desired to take the sashes out for cleaning, the before-mentioned screws are loosened until the sash can be pushed so far into the deep groove on one side as to pass out of the groove on the other side, when it is easily reversed for cleaning, the cords being long enough to admit of this. The top sash has to be brought down to the bottom to be turned, and has to be turned outward instead of inward before it can be drawn in, which may be a little awkward. The patentees observe that in consequence of these screws by which the sash can be tightened up, it is not necessary to fit the sash so accurately as is usually required. This might be put in another way; the sash could not easily be got out if it were fitted very accurately to the rebate, and though the tightening screws prevent shaking, we should fear that in windy weather it would be found a rather draughty sash. It has, however, a good deal of merit, and is worth attention.

SURVEYORS' AND AUCTIONEERS' CLERKS' PROVIDENT ASSOCIATION.—We have received the annual report of this Association, from which we learn that the number of members has increased. The management expenses and the sick fund have been nearly covered by the interest investments. The annual meeting of members and subscribers is to be held at the Auction Mart on Wednesday, the 7th.

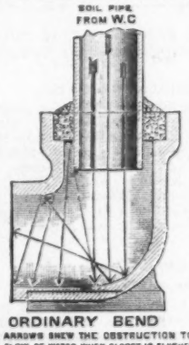
BRIGHTON MASTER BUILDERS' ASSOCIATION.—The first annual meeting of the Brighton Master Builders' Association was held on the 21st ult., at the Brighton Town Hall, Alderman Botting, J.P., presiding. The report showed that the membership of the Society was now eighty-seven. Alderman Botting, J.P., was re-elected chairman; Mr. Thomas Garrett was appointed vice-chairman; and the following were elected to form the committee:—Messrs. Barnes, Parsons, Willett, Longley, Patching, Dean, Wright, and Willmer. Mr. George Lynn was re-elected treasurer, Mr. C. Lynn, jun., hon. secretary, and Messrs. H. Manwaring and F. T. Wilson auditors.

CIVIC ARCHITECTURE.—On the 13th ult. Alderman P. H. Rathbone lectured at the Picton Lecture Hall, William Brown-street, Liverpool, on "The Public Buildings of Liverpool and Other Great Cities of the World." After stating that buildings were the real expression of the life of a city, the lecturer said:—The importance of cities having really fine buildings is very great, but I don't think we in England sufficiently realise it. To the city in which it is situated, a really fine building is a permanent source of wealth. In the first place it is a public announcement that round it are grouped an intelligent and industrious population, who had the power and sense to build it. A great public building is not only a source of wealth, but a bond between all classes. Unlike a book, or a great picture, it cannot be the work of a single man. The genius of the architect requires the assistance of great and varied skill. Such a building has an element of permanence which is of great value to the prosperity of a city. Most great cities have understood this, and those which have not have practically passed away. . . . The poorest citizen feels that a great public building belongs to him as well as to the richest and most powerful of his fellow citizens. The artisans feel that they made it; they helped, they or their forefathers, to pay for it. Therefore they are proud of it—are proud of being citizens of the town which has raised it. As Englishmen we are proud of the Houses of Parliament. We compare them with the Chamber of Deputies in Paris, and we feel their noble architecture to be a proof that we are proud of our Parliamentary institutions, with their long history and unbroken power. The Parisian is proud of being a Parisian. Paris believes in Paris, and therefore it is that the Town Hall of Paris, not the Chamber of Deputies, is the great building of their city. They spared neither expense nor genius nor energy in making their Town Hall the finest in the world. If you would inquire which cities in England have most life and vigour, you will find them to be those which are raising noble public buildings to declare their present prosperity, and ensure their future duration. But this cannot be accomplished without the aid of educated artisans. It is therefore the duty of the city to secure the education of those classes of artisans necessary to ensure architectural success. I think we too, are awakening to this. We are about to establish schools for those arts connected with the mother of them all—architecture; and when they are established I hope the city will be enabled to assist in finding employment for their students. It is very sad to think of the amount of genius in our nation which we know to have been wasted and lost through the absence of opportunities, genius which would have tended to make our nation greater and nobler than it is. However great the genius of an architect may be, he requires the earnest and enthusiastic help of his fellow-citizens. Architecture is a national branch of art as distinguished from individual branches.—The lecture was illustrated by numerous lantern pictures of famous buildings throughout Europe.

SANITARY APPLIANCES.—We have received from Mr. F. C. Lynde, Consulting Sanitary Engineer, of Manchester, a book of illustrated sheets of various



improvements in sanitary appliances devised by him. Some of these are very good, and there is a general good standard of work indicated in the illustrations, though we do not see that all things claimed as improvements are so. We are very doubtful, for instance, about Mr. Lynde's favourite form of trap with an angle at the bottom instead of a bend, and are at a loss to understand what benefit is expected from it, though the general make seems very good, and the broad and solid stand or basis for the trap is a good feature. The form of bend called the "deflector bend," for the junction of the foot of a soil-pipe, of which we give an engraving, seems to have a practical value. The carriage-drive grid, with an arrangement for keeping sand out of the trap is good; by the construction of the top a sufficient catchplate for the sand is provided around the water outlet, which stands above it. The appliances are specially distinguished as the "Loco" Sanitary Appliances.



MEETINGS.

FRIDAY, MARCH 2.

Architectural Association.—Mr. S. B. Beale on "Colour in Street Architecture." 7.30 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Mr. Charles Mason on "Scavenging, Disposal of House Refuse." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. Herbert W. Umney on "Efficiency and Economy of Elevators." 7.30 p.m.

SATURDAY, MARCH 3.

Architectural Association.—(1) Visit, at 1.45 p.m., to the United Service Institution, Whitehall. (2) Visit, at 3.15 p.m., to the new Admiralty Offices, St. James's Park.

Builders' Foremen and Clerks of Works' Institution.—Annual Dinner, Holborn Restaurant. 6 p.m.

Sanitary Institute.—Visit to East London Waterworks, Lea Bridge. 1.30 p.m.

Royal Institution.—Lord Rayleigh on "Light, with Special Reference to the Optical Discoveries of Newton." IV. 3 p.m.

Queen's College, Cork.—Mr. Arthur Hill on "The History of Architecture." VIII. 3 p.m.

MONDAY, MARCH 5.

Surveyors' Institution.—Mr. Howard Martin on "The Report of the Local Government and Taxation Committee of the London County Council on the Subject of the Rating of Ground Values." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Hugh Stannus on "The Decorative Treatment of Artificial Foliage."—III. 8 p.m.

Victoria Institute.—8 p.m.

Liverpool Architectural Society.—Paper by Mr. James H. Cook, entitled "Three Years' Architectural Life in America." 6.30 p.m.

Leeds and Yorkshire Architectural Society.—Exhibition of Architectural Drawings. 7.30 p.m.

TUESDAY, MARCH 6.

Institution of Civil Engineers.—Further Discussion on Messrs. J. H. Greathead and F. Fox's paper on "The Liverpool Overhead Railway," and Mr. T. Parker's paper on "The Electrical Equipment of the Liverpool Overhead Railway." 8 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Professor A. Wynter Blyth on "Diseases of Animals in Relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for Food." 8 p.m.

Society of Biblical Archæology.—8 p.m.

Glasgow Architectural Association.—Annual Business Meeting. 8 p.m.

WEDNESDAY, MARCH 7.

Carpenters' Hall, London Wall (Free Lectures on Matters Connected with Building).—Mr. T. E. Collcutt on "The Imperial Institute." 8 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Visit of Inspection in the Parish of St. George's, Hanover-square. 2 p.m.

Edinburgh Architectural Association.—Mr. T. A. Croal on "The Man in the Street; or a Non-Professional View of Architecture." 8 p.m.

Institution of Civil Engineers of Ireland.—Meeting at 35, Dawson-street, Dublin. 8 p.m.

Society of Arts.—Prof. Carl Linde, of Munich, on "Refrigerating Apparatus." 8 p.m.

British Archæological Association.—(1) Mr. Allan Wyon, F.S.A., on "Another Great Seal of Charles II., and Supplementary Information Respecting other Great Seals of England"; (2) Mr. J. T. Irvine on "Discoveries in Repton Church." 8 p.m.

THURSDAY, MARCH 8.

Institution of Electrical Engineers.—Mr. W. M. Mordey on "Parallel Working through Long Lines." 8 p.m.

Society of Antiquaries.—8.30 p.m.

FRIDAY, MARCH 9.

Sanitary Institute (Lectures for Sanitary Officers).—Dr. W. H. Hamer on "Infectious Diseases and Methods of Disinfection." 8 p.m.

SATURDAY, MARCH 10.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Visit to Sewage and Destructor Works, Ealing. 2 p.m.

Royal Institution.—Lord Rayleigh on "Light, with Special Reference to the Optical Discoveries of Newton." V. 3 p.m.

Edinburgh Architectural Association.—(1) Visit to Chancelot Roller Flour Mill, Bonnington. (2) Visit to Pilrig House.

Queen's College, Cork.—Mr. Arthur Hill on "The History of Architecture." IX. 3 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

4,919.—COMBINED SCREW AND NAIL: *W. E. Kinnerney* (New Zealand).—According to this invention, instead of manufacturing a screw with a worm from the end to within a short distance of the top, the improved method makes the worm commence at such a distance from the end as to occupy about a third of its entire length, leaving the remainder of the surface below it without a worm and the end sharp pointed, so as to admit of its being readily driven up to or a little beyond the worm into the material, and from there turned with a screwdriver as at present.

5,016.—HEAT IN FIREPLACES, &C.: *D. W. Cuthbert.*—This invention utilises the known properties of certain salts, such as acetate of soda, or of common salt, or of strong solutions of the same to give out the heat again more or less slowly, according to modes of application, which are described in the specification.

5,114.—APPARATUS FOR MAKING SANITARY-PIPES: *H. J. & A. Coulthurst.*—In the machinery used in the manufacture of socketted pipes, the die through which the clay is forced, and in which the socket of the pipe is formed is altered and improved with a view to making a better joint and for cutting off the pipe when formed.

6,263.—COMBUSTION OF FUEL: *W. P. Bonwick.*—A tube or chimney of fireclay or such like material is, according to this invention, placed amongst the fuel, and forms a means of conducting the draught upward, so as to quickly draw up the fire.

6,547.—VENTILATORS: *H. L. Hansen and another.*—In automatic ventilators (those in which the wind, striking the outer surface of the baffle plates, creates the suction or upward current in the shaft) the baffle plates are made in a curved form from the bottom to the top of the ventilator, or they are bent into hexagonal or other form. These baffle plates themselves form the hood or cowl.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Covered Market, with Shops, Offices, &c...	Goole Local Board....	100*l.* 50*l.*	April 16
*Extension of Market and New Hotel.....	Lancaster Corp.	75*l.* 25*l.*	May 1
*Municipal Buildings	Llandudno Impt. Com.	50*l.* and 25*l.*	May 31
Water Supply Schemes	Ledbury R.S.A.	.....	No date.
*Development of Building Estate.....	Artizans' Land and Mortgage Corp. Ltd.	50*l.* 20*l.* and 20*l.*	do.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
School Buildings, Nursling, Southampton	.....	Lemon & Blizard	Mar. 6
House, Jerry-lane, Sowerby-bridge, Yorks	.....	S. Wilkinson	do.
Promenade, Boston-road.....	Brentford Local Board	J. H. Strachan.....	do.
Alterations to Wards and Laundry, Leeds-road	Bradford Corp.	J. H. Cox	do.
Hall and Club Premises, Aberdare.....	.....	T. C. Wakeling	do.
Several Cottages, Mountain Ash, Glam. ..	Nixon's Navigation Co. Lim.	.....	do.
Additions, &c. Park-villa, Yelverton.....	H. G. Polkinghorne ..	Wiblin & De Bolnville	Mar. 7
Shed, &c. Greengates, Leeds	.....	E. Wright.	do.
Extension of Commercial Hotel, Grange-over-Sands	Mrs. Barnes	J. Stalker	do.
Fire Station.....	Hyde Corporation	J. Mitchell	do.
Causewaying Streets	Dunfermline (N.B.) Burgh Commrs.	*Official*	do.
Additions, &c. Oddfellows' Hall, Meltham, Huddersfield	.....	J. Kirk & Sons.....	Mar. 8
Church Institute, Yeadon, Yorks	.....	T. & F. Healey.....	do.
Sewers, Comber, Ireland	Newtownards Union..	P. C. Cowan	do.
Engine-house, Stores, &c. Grattan-road, Bradford.....	.....	T. C. Hope.....	Mar. 9
Water Main (eight miles), Wharfedale....	Leeds Corporation	T. Hewson.....	do.
*Stone for Macadamizing	Hull Corporation	*Official*	do.
Water Mains, Bridge-street and York-road	Guildford U.S.A.	do.	Mar. 10
Road Works, Queen's-road	Weston-super-Mare Impt. Commrs.....	H. Nettleton.....	do.
Granite (6,000 tons)	Brixworth (Northants) Highway Board	T. Gulliver	do.
Wesleyan Chapel, Wragby, Lincs.	Rev. T. K. Jackson ..	J. Willis	do.
*Coal, Coke, Disinfectant, Stone, &c. &c. ..	St. Giles' Bd. of Wks.	G. Wallace	Mar. 12
*Asphalte Paving	do.	do.	do.
School Extension, &c. Ilminster.....	.....	Price & Wooler	do.
Technical Education Institute, High-street, Chatham	.....	G. E Bond	Mar. 13
Cottage Hospital, Brunel-street, Horwich	Lancs. & Yorks. R. Co.	H. Shelmerdine	do
Additions, &c. to School, Rose-hill.....	Ipswich School Board	E. F. Bishopp.....	do.
Road Works, Maidstone.....	Kent County Council	F. W. Ruck	do.
*Tarpaving Playgrounds and Yards.....	West Ham School Bd.	Newman & Jacques	do.
*Portland Cement	Aberdeen Town Coun.	W. Dyack	do.
*Public Offices and Institute	Leyton Local Board ..	J. Johnson	do.
*Works and Materials	Tottenham Loc. Bd. ..	*Official*	do.
*Works and Materials	Lewisham Bd. of Wks.	do.	do.
*Main Drainage Works.....	Newbury Town Council	J. Anstie	do.
*Works and Materials	Southgate Loc. Bd. ..	C. G. Lawson	do.
*Wrought-Iron Gates and Railings	Willesden Local Board	O. Claude Robson	do.
Ten Residences, Holly-avenue, Newcastle-on-Tyne	Jesmond Manor House Estate	J. W. Dyson.....	do.
*Stoneware Pipe Sewer, &c.....	Borough of West Ham	L. Angell	do.
*Wood Paving Works	St. Luke's Vestry	*Official*	do.
*Sewerage Works, Granite, &c.	Lewisham Bd. of Wks.	do.	do.
*Works and Materials	Fulham Vestry	do.	Mar. 14

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered
*Various Works	Hackney Bd. of Works	J. Lovegrove.....	Mar. 14
*Works and Materials	Kingston High. Board	A. J. Henderson.....	do.
Three Villas, Grange-over-Sands.....	J. H. Midgley	S. Shaw	do.
*Making-up and Paving Roads	Fulham Vestry	W. Sykes	do.
Offices, Chapel-street	Salford School Board	Woodhouse & Willoughby	Mar. 15
*Works and Materials	Wood Green Loc. Bd.	C. J. Gunyon	do.
Sewers, Kerbing, &c. Temperance-street ..	Swinton (Yorks.) Loc. Board	G. J. Monson	do.
Earthenware Pipe Sewer (2,799 yds.) Great Houghton, near Barnsley.....	Hemsworth U.R.S.A.	Mr. Richardson	do.
Road Works, Chipping Norton	Chadlington Highway Board	F. Forrester	do.
*Works and Materials	War Department	*Official*	Mar. 16
Additions, &c. to St. Thomas School, Kendal	.....	S. Shaw	do.
*Pumping Station and Destructor Buildings	Cambridge Corp.	J. T. Wood	Mar. 19
*Rising Main	do.	do.	do.
Surveyor's Materials	Heywood (Lancs.) Corp	Jas. Diggle	do.
Infirmary, &c. at Workhouse	Chertsey Union	C. Welch	do.
*Covered Reservoir, Cast-Iron Pipes, &c. Ackworth	Hemsworth Union....	C. Hodson.....	Mar. 20
Surveyor's Materials	Colchester Corp.....	H. Goodyear.....	do.
School Buildings, Nantymoel, Wales	Llandyfodwg Sch. Bd.	Jacob Rees.....	Mar. 21
Brick Walling, &c. Didsbury (Lancs.)	Withington Loc. Bd...	A. H. Mountain	Mar. 26
*Sewerage Works	Cheshunt Local Board	S. Towlson.....	do.
*Extension of Fish Quay, &c.....	Torquay Corp.	H. A. Garrett	Mar. 27
*Coast Guards' Houses, Bottom, nr Swanage	Admiralty	*Official*	do.
*Making-up Roads	Tottenham Loc. Bd. ..	F. E. Murphy	do.
*1,150 tons Cast-Iron Water Mains, &c. ..	do.	do.	do.
*Works at Swithland Reservoir	Leicester Corp.	J. B. Everard	April 3
Additions to House, Linden-avenue, Kidderminster	Wm. Adam	J. M. Gething	No date
Shop and Two Houses, Queen-street, Rushden	E. Claridge & Son	H. Adnitt	do.
Alterations to 291, Padihaxi-road, Burnley	Jas. Kenyon.	A Robinson	do.
Citadel, Annetwell-street	Carlisle Citadel Co. Ltd	A. Gordon.....	do.
Road-Making and Sewering, Leigh (Essex)	W. Beecroft	Wright & Biggins	do.
Warehouse and Offices, Canal-street, Nottingham	.....	W. D. Pratt	do.
Twenty-four Cottages, Leeds-road, Otley	.....	A. Marshall	do.
House, Queen's-road, Aberdeen	.....	Matthews & Mackenzie	do.
Warehouse, Valley Mills, Manningham, Bradford.....	.....	Jas. Young & Co.	do.
Storehouse, &c. Tillery Colleries, Abertillery, S. Wales	Powell's Tillery Steam Coal Co. Ltd.	*Official*	do.
Road Metal (2,400 tons)	Abingdon High. Board	C. Tame	do.
Sewers, &c. South-street.....	Rugby Freehold Land Society.....	J. T. Franklin.....	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Inspector of Works	Plymouth Corp.	3*l.* per week.	Feb. 26
*Builder's Foremen (Two), Invoice Clerk, Ordering Clerk, &c.	London County Council	See Advertisement....	Mar. 7
Engineer	Tunbridge Wells T.C.	2*l.* 5*s.* per week, house, &c.	Mar. 10
*Clerk of Works	Bromley School Board	3*l.* 3*s.*	Mar. 12
*Building and Drains Inspector	Croydon Corp.	50*s.* per week	Mar. 14

Those marked with an Asterisk (*) are advertised in this number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., viii., ix. *and* x. *Public Appointments, p.* xxiii., *and* xxv.

17,514.—PROTECTING TIMBER STRUCTURES: *W. Smith.*—Timber is, by means of this invention, protected from sea-worms, damp, &c., by sheathing it in an antiseptic composition of asphalte, rendered antiseptic by any mineral poison, boracic acid, or any suitable antiseptic not of a volatile nature.

17,893.—TOOL FOR PLUMBERS: *F. J. & A. Bailey.*—This is a tool to be used in preparing the ends of lead pipes preparatory to soldering the ends together. One part of the tool forms a cone to be put inside the pipe, and having one of its edges where they come together sharpened after the manner of the well-known form of lead-pencil sharpener. When this is inserted and turned it pares the inside of the pipe away in a conical form. The other end of the tool is made to fit over the outside of the pipe, and to shape it also in a conical form.

22,940.—ROOFING TILE: *T. Hildebrand.*—The tile which forms the subject of this patent is made of quadrangular shape, with grooves or channels along each of its sides, the first of these being turned to the front of the tile or plate, the other pair being turned to the rear of the tile, so that two or more tiles can be joined by simply interlocking them.

NEW APPLICATIONS FOR LETTERS PATENT.

FEBRUARY 12.—2,996, G. Marsden, Construction or Shape of Tile or Tiles.—3,016, A. Higgs, Fire-Grates and Chimney-Flues for Dwelling-houses and other Purposes.—3,023, B. Haigh, Flushing Apparatus.—3,033, J. Beecroft and A. Shiner, Door Fastener.

FEBRUARY 13.—3,050, A. Dresser, Disinfectant Sprinkler for Water-closets.—3,090, E. Hart, Appliances for Checking Doors.—3,099, D. Young, Window-sashes and Frames.

FEBRUARY 14.—3,153, A. Hartley, Windows.—3,167, T. Haussen, Lining for Grooved Tiles and Corrugated Iron Roofs.—3,194, A. Boult, Mode of and Apparatus for Bevelling Glass and Polishing the Bevel.—3,199, H. Keene, Securing Scaffolding Together.—3,218, F. Trier, Stone Saws and Frames.—3,221, J. Jones and W. Sykes, London.—3,233, H. Brown and R. Mitchell, London.

FEBRUARY 15.—3,240, E. Nuttall and T. Oddy, Tread for Stairs, Steps, Floors, &c.—3,241, T. Twyford, Water-closets or Water-closet Basins.—3,242, T. Twyford, Flushing Cisterns.—3,269, W. Sainsbury and A. Bennett, Window-Frames and Sashes.—3,276, J. Kilpatrick, Drainage Traps.—3,286, J. Rettie, Buildings.—3,287, J. Spencer, Domestic Stoves or Fireplaces.

FEBRUARY 16.—3,325, H. Denison, Machine for Grinding or Whetting Chisels or other Edged Instruments.—3,359, H. Clay, Boilers for Ranges.

FEBRUARY 17.—3,417, E. Wilson, Wood-working Machines for Trimming, Mitring, &c.—3,430, G. Newman, Spring Hinges.—3,434, A. Brown and H. Pruce, Connecting Door and like Knobs to their Spindles.—3,449, W. Johnson, Sash Pulleys.—3,458, W. Briggs, Flushing Apparatus for Water-closets.—3,472, T. Parker, Brick Presses.

PROVISIONAL SPECIFICATIONS ACCEPTED.

23,356, J. Brown and D. Simpson, Window-sashes.—586, A. Chocarne, Flooring Girders.—705, P. Willis, Trimming Saw Teeth.—938, F. Ballard, Utilising the Heat given off from Brick-burning Kilns.—1,126, J. Moseley, Covering for Walls, Ceilings, Floors, &c.—1,294, T. Williams, Door Handles or Knobs.—2,212, T. Houghton, Windows.—2,297, O. Frotscher, Window-frames and Sashes.—2,444, B. Dadley, Cantilever Bridges, Suspension Bridges, &c.—2,683, W. Sheerman and G. Elliott, Wood-cutting tool.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

3,365, D. Manning and J. Andrews, Flushing Cistern and Water-waste Preventer.—7,504, R. Astley, Construction of Fireproof Floors.—202, W. Press, Filtering Apparatus for Water Cisterns.—798, C. Ernenputsch, Roofing-tile.—889, E. Hutchins, Ventilating Apparatus for Window-sashes.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

FEBRUARY 6.—By *Chancellor & Sons* (at Richmond): "Milestone House," London-rd., Hounslow, f., r. 45*l.*, 810*l.*; 2 to 8 (even), Queen's-rd., Twickenham, u.t. 67 yrs., g.r. 18*l.*, 1,250*l.*

FEBRUARY 15.—By *Fuller, Moon, & Fuller* (at Croydon): "Rose Villa," Brighton-rd., Purley, u.t. 82 yrs., g.r. 9*l.*, r. 45*l.*, 450*l.*

FEBRUARY 19.—By *W. W. Read & Co.*: 16, Lorne Gardens, Regent's Park, u.t. 18 yrs., g.r. 5*l.* 10*s.*, 450*l.*—By *F. Perks*: 59, Mornington-rd., Regent's Park, u.t. 45 yrs., g.r. 12*l.*, r. 70*l.*, 650*l.*; 4, Osnaburgh-ter., u.t. 28 yrs., g.r. 18*l.*, r. 105*l.*, 860*l.*; 6 and 7, Osnaburgh-ter., u.t. 28 yrs., g.r. 24*l.*, r. 215*l.*, 1,945*l.*

FEBRUARY 20.—By *Humbert, Son, & Flint*: 11, 13, Humbolt-rd., Fulham, f., 410*l.*—By *F. J. Bisley & Sons*: 8, Pedworth-rd., Rotherhithe, u.t. 60 yrs., g.r. 4*l.*, r. 33*l.* 16*s.*, 255*l.*; 81, Chilton-st., u.t. 41 yrs., g.r. 2*l.* 10*s.*, 210*l.*; 3, 5, 7, Hawkstone-rd., u.t. 58 yrs., g.r. 9*l.*, 520*l.*; 40, Burgoyne-rd., Stockwell, u.t. 70 yrs., g.r. 4*l.* 17*s.* 6*d.*, 250*l.*; 45, Langton-rd., Camberwell, u.t. 61 yrs., g.r. 4*l.* 10*s.*, 190*l.*; 3 to 9 (odd), Firbank-rd., Peckham, u.t. 81 yrs., g.r. 18*l.*, 820*l.*—By *J. W. Truman*: 7, Hartfield-rd., Wimbledon, and 13, Railway-pl., u.t 73 yrs., g.r. 10*l.*, r. 106*l.* 16*s.*, 1,100*l.*; 5 and 6, The Broadway, u.t. 70 yrs., g.r. 13*l.* 10*s.*, r. 148*l.*, 2,500*l.*; The Broadway, "The Prince of Wales Hotel," f., with reversion, 5,810*l.*

FEBRUARY 21.—By *Norman & Son*: 43 to 53 (odd, Boston-rd., Croydon, and 21, 23, 25, Wortley-rd., u.t. 78 yrs., g.r. 47*l.* 5*s.*, 400*l.*; 1 to 4, Alma Cottages; and 1 to 4, Croham Cottages, u.t. 96 yrs., g.r. 42*l.*, 400*l.*—By *Inman, Sharp, Harrington & Roberts*: 9 and 13, Caroline-st., Camden Town, u.t. 28 yrs., g.r. 27*l.*, r. 64*l.*, 265*l.*; 100, Euston-st., Euston-sq., u.t. 25 yrs., g.r. 17*l.* 17*s.*, 95*l.*—By *G. Brinsley*: 10 to 16 (even), Brisbane-rd., Camberwell, u.t. 69 yrs., g.r. 15*l.*, 285*l.*—By *T. Bate & Co.*: 39, 41, and 43, Skidmore-st., Mile End, f., 620*l.*; 29 and 37, Cambridge-av., Kilburn, u.t. 64 yrs., g.r. 20*l.*, r. 100*l.*, 780*l.*; 45 to 53 (odd), Albert-rd., u.t. 68 yrs., g.r. 26*l.* 5*s.*, 1,160*l.*; 5 to 8, Alpha-pl. North, u.t. 63 yrs., g.r. 20*l.*, 425*l.*; 3A, 4A, and 5A, West Row, Kensal Town, u.t. 19 yrs., g.r. 21*l.*, 195*l.*

FEBRUARY 22.—By *C. C. & T. Moore*: to 4, Chadbu rn st., Poplar, u.t. 48 yrs., g.r. 12*l.*, 300*l.*; 72, Antill-rd., Bow, u.t. 74 yrs., g.r. 4*l.* 15*s.*, 325*l.*—By *Farebrother, Ellis, & Co.*: 11, Cosmo-pl., Bloomsbury, f., r. 85*l.*, 1,300*l.*; 9, Houndsditch, City of London, u.t. 44 yrs., g.r., 13*l.* 3*s.*, r. 200*l.*, renewable every 14 yrs., 3,800*l.*—By *J. Baker*: an enclosure of f. land, Willesden-lane, 4a. 2r. 1p., 7,680*l.*; f.g.r. of 21*l.*, reversion in 55 yrs., 890*l.*; four plots of f. land, Telford and Pollard-rds., Hendon, 55*l.*—By *Stimson & Sons*: 4, Jelf-rd., Brixton, u.t. 78 yrs., g.r. 6*l.* 10*s.*, 190*l.*; 179, Boyson-rd., Walworth, u.t. 58 yrs., g.r. 4*l.* 10*s.*, r. 50*l.*, 385*l.*; improved rental of 11*l.*, Orville-rd., Battersea, u.t. 89 yrs., 115*l.*; 1, Shields-st., Peckham, u.t. 70 yrs., g.r. 6*l.*, r. 45*l.*, 400*l.*—By *Worsfold & Hayward* (at Dover): 5, Market-st., Dover, f., r. 23*l.*, 350*l.*; 1 to 7, Market-ct., f., 466*l.*; 1, Church-st., f., 225*l.*; 19, Norman-st., u.t. 32 yrs., g.r. 1*l.*, 310*l.*; "The Old Head Post Office," Northampton-st., u.t. 63 yrs. g.r. 10*l.*, 770*l.*—By *Newbon & Co.*: 48, 49, Lee-st., Haggerston, u.t. 25 yrs., g.r. 4*l.*, r. 52*l.*, 410*l.*; 66A, Stean-st., u.t. 25 yrs., no g.r., r. 21*l.*, 160*l.*; 29 to 37 (odd), Waldemar-av., Fulham, u.t. 91 yrs., g.r. 35*l.*, r. 160*l.*, 1,135*l.*; 58, 60, Brecon-rd., u.t. 93 yrs., g.r. 10*l.*, 240*l.*; "Ashby Villa," Vancouver-rd., Catford, u.t. 89 yrs., g.r. 6*l.* 10*s.*, r. 37*l.*, 280*l.*; "Hatherleigh," u.t. 89 yrs., g.r. 6*l.* 10*s.*, r. 37*l.*, 265*l.*

FEBRUARY 23.—By *W. B. Hallett*: 20, London-rd., Clapton, u.t. 62 yrs., g.r. 6*l.*, r. 28*l.*, 255*l.*; 32, Tremlett-grove, Holloway, u.t. 79 yrs., g.r. 7*l.* 7*s.*, r. 38*l.*, 350*l.*—By *Baker & Sons*: 5, Ulster-ter., Regent's-pk., u.t. 30 yrs., g.r. 35*l.*, r. 150*l.*, 1,000*l.*; 2, Harvey's Buildings, Strand, f., r. 90*l.*, 1,930*l.*; 3, Harvey's Buildings, f., r. 150*l.*, 2,710*l.*; six plots of f. land, Iverson-rd., Kilburn, 217*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street.; rd. for road; sq. for square; pl. for place; ter. for terrace cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	9/0/0 0/0/0
Teak, E.I.	load	9/10/0 15/10/0
Sequoia, U.S.ft.cu		2/3 2/6
Ash, Canada load		2/10/0 3/15/0
Birch, do.		2/10/0 3/10/0
Elm, do.		3/5/0 4/10/0
Fir, Dantsic, &c.		1/5/0 2/10/0
Oak, do.		2/15/0 5/0/0
Canada		5/10/0 7/0/0
Pine, Canada red		2/15/0 3/5/0
Do. Yellow		2/5/0 4/10/0
Lath, Dantsic, fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10/0
Wainscot, Riga, &c., log		2/5/0 4/10/0
Odessa, crown		2/5/0 4/10/0
Deals, Finland and & 1st std 100		8/0/0 10/10/0
Do. 4th & 3rd		7/10/0 8/0/0
Do. Riga		7/10/0 9/0/0
St. Petersburg, 1st yellow		10/0/0 13/10/0
Do. 2nd yellow		8/0/0 9/0/0
Do. white		8/10/0 11/0/0
Swedish		8/0/0 16/0/0
White Sea		8/0/0 16/10/0
Canada, Pine 1st		22/10/0 29/10/0
Do. do. 2nd		17/0/0 18/10/0
Do. do. 3rd, &c.		7/10/0 10/10/0
Do. Spruce, 1st		9/0/0 11/0/0
Do. do. 3rd & 2nd		6/10/0 7/15/0
New Brunswick		6/0/0 7/5/0
Battens, all kinds		3/0/0 15/0/0
Flooring boards, sq., 1 in. prep.		0/10/6 0/15/6
1st		0/7/6 0/13/0
Do. 2nd		Other qualities— 0 5/3 0/7 0
Cedar, Cuba	ft.	/3½ /4½
Honduras, &c.		/3 /4½
Mahogany, Cuba		/3½ /6
St. Domingo, cargo av.		/3 1/6
Mexican do. do.		/3 /4
Tobasco do. do.		/3½ /6
Honduras do.		/3½ /5½
Box, Turkey	ton	4/0/0 13/0/0
Rose, Rio		8/0/0 18/0/0
Bahia		7/0/0 17/0/0
Satin, St. Domingo		0/0/5 0/1/0

TIMBER (*continued*).		
Satin, Porto Rico		0/0/6 0/1/6
Walnut, Italian		0/0/3½ 0/0/7
METALS.		
Iron—Pig, in Scotland	ton	2/3/0½ 0/0/0
Bar, Welsh, in London		5/17/6 6/0/0
Do. do. at works in Wales		5/7/6 5/10/0
Do. Staffordshire, in London		6/0/0 6/10/0
COPPER—British cake and ingot		42/15/0 43/5/0
Best selected		43/10/0 44/10/0
Sheets, strong		52/0/0 0/0/0
Chili, bars		41/0/0 41/5/0
YELLOW METAL	lb	0/0/4¾ 0/0/5
LEAD—Pig, Spanish	ton	9/7/6 9/10/0
English com. brands		9/7/6 9/8/9
Sheet, English, 6 lbs. per sq. ft. and upwards		11/0/0 0/0/0
Pipe		11/10/0 0/0/0
ZINC—English sheet	ton	19/10/0 0/0/0
Vieille Montagne		20/0/0 0/0/0
TIN—Straits		66/7/6 66/17/6
Australian		66/12/6 67/2/6
English Ingots		72/0/0 72/10/0
Banca		69/0/0 70/0/0
Billiton		68/0/0 68/10/0
OILS.		
Linseed	ton	20/2/6 20/5/0
Cocoanut, Cochin		30/10/0 31/0/0
Do. Ceylon		24/0/0 0/0/0
Palm, Lagos		24/0/6 0/0/0
Rapeseed, English pale		21/15/0 22/10/0
Do. brown		20/5/0 0/0/0
Cottonseed ref.		20/0/0 21/10/0
Oleine		22/0/0 24/0/0
Lubricating, U.S.		4/0/0 5/0/0
Do. refined		5/0/0 12/0/0
TAR—Stockholm	barrel	0/19/6 1/0/0
Archangel		0/12/6 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

ALCESTER.—For the erection of six almshouses, for the William Smallwood Trust. Messrs. Blower & Slatter, architects, Curzon-chambers, Birmingham :—

G. F. Smith & Sons	£1,700	J. Grant	£1,298
J. S. Kimberley	1,610	A. Espley & Co.	1,205
W. Lissaman, junr.	1,479	A. H. Goff	1,288
C. G. Hinns & Sons	1,430	H. Taylor	1,267
J. Harris	1,351	J. T. Sheppard	1,196
J. Smallwood & Co.	1,350	J. Stanley*	1,040
R. Stanton	1,298		

* Accepted.

BANGOR (N. Wales).—For taking down buildings, Longpobty ; and constructing new road to Caelleppa, for the Highways Committee. Mr. Jno. Gill, C.E., Borough Surveyor, Bangor :—

Evan Williams	£478 10	Wm. Parry, Jun.	£374 13
John Lees	450 0	John Roberts, Bangor (accepted)	340 14
W. O. Daniel	440 0		

[Surveyor's estimate, £396 15s.]

BLACKPOOL.—Accepted for the electric lighting of the Blackpool Tower Buildings, Messrs. Maxwell & Tuke, architects, Manchester :—

Verity, Sons, & Siemens £6,092 10 0

For Plastering.

T. & S. Wardle, Manchester (accepted) £2,260 0 0

BRADFORD (Yorks).—Accepted at Schedule of Prices, for the erection of residence and stabling, Barkerend, for Mr. W. J. Parkinson. Mr. James Ledingham, architect, District Bank Chambers, Bradford. Quantities by the architect :—

Masons' and Fosters' work.—K. Wilkinson & Sons, Bradford.
Plumbers' work.—Thomas Nunwick, Bradford.
Slaters' work.—Hill & Nelson, Bradford.
Plasterers' work.—A. Taylor, Bradford.
Painters' work.—W. Priestley, Bradford.

CHAGFORD (Devon).—For rebuilding building premises, for Mr. F. Splatt. Messrs. Kerley & Ellis, architects, Exmouth and Exeter :—

Brimblecombe & Ellis	£764 12	Hayman, Exmouth*	£619 0

* Accepted with amendments.

CLAYTON (Yorks).—For the erection of additional vagrant wards at workhouse, for the North Bierley Union Guardians. Mr. Jno. Drake, C.E., architect, Winterbank, Queensbury :—

Mason.—Oliver Booth, Great Horton	£378 10 0
Joiner.—Sam Beem, Queensbury	123 12 0
Slaters.—Hill & Nelson, Bradford	54 0 0
Plasterer.—Samuel Sunderland, Great Horton	25 0 0
Plumber and Glazier.—Edwin Bairstow, Thornton	129 0 0
Painter.—Edwin Bairstow, Thornton	13 10 0
Total	714 12 0

[Architect's estimate, £750.]

CROWAN (Cornwall).—For the erection of school buildings, Moorfield, Praze, for the School Board. Messrs. Carah & Son, architects, Praze, Camborne :—

Pengilly & Treloance	£2,164 9	Kittle Brothers	£1,775 0
T. Julian	1,880 0	Mitchell & Dunn	1,730 0
Delbridge & Co.	1,850 0	White & Thomas, Crowan*	1,605 0
Nicholls & Son	1,794 0	Stephens	1,492 0
Arthur Karkeek	1,776 0		

* Provisionally accepted.

DARLASTON.—For the erection of four cottages, Darlaston, portion of materials supplied. Mr. Henry E. Farmer, architect, Darlaston. Quantities by the architect :—

M. Huskison	£550	France & Tranter, Darlaston (accepted)	415
Wm. Lees	475		
Hammond Bros.	432		

EAST HAM.—Accepted for the erection of a house in Heigham-road, East Ham, Essex, for Mr. A. G. Desmond :—

J. Baxter £425

EXMOUTH.—For building detached cottage at Withycombe. Messrs. Kerley & Ellis, architects, Exmouth :—

Atkins	£275 0	Cooper	£235 0
Dart	256 4	Grace, Exmouth*	217 0

* Accepted.

EXMOUTH.—Accepted or building detached villa at Exmouth. Messrs. Kerley & Ellis, architects, Exmouth :—

Baker & Hanger £450 0 0

EXMOUTH (Devon).—For the erection of Masonic Hall and Club, for the Exmouth Masonic Hall and Club Company, Limited. Messrs. Kerley & Ellis, architects, Exmouth and Exeter. Quantities not supplied :—

First Tenders.

Perry	£1,452 0 0	Hooper, Exmouth*	£1,200 0 0
Grace	1,390 0 0		
Hayman	1,367 13 6		

* Accepted, but died before contract was signed.

Amended Tenders.

Phillips	£1,320 0 0	Hayman, Exmouth*	£1,260 0 0
Cooper	1,295 0 0	Atkins	1,257 0 0

* Accepted.

FOREST GATE. — Accepted for the erection of five small houses in Khedive-road, Forest Gate, Essex, for Mr. E. Gretton :—

J. Baxter £1,400

GREAT YARMOUTH.—For additions to business premises, Broad-row, for Mr. W. F. Carrier. Mr. Charles G. Baker, architect, Town Hall Chambers, Great Yarmouth :—

J. Harman	£891	G. Beckett	£743
F. Grimbie	820	A. Bond	743
J. Bray	788	N. Barnard, South Town, Gt. Yarmouth (accepted)	689
Wm. Cork	746		

HALIFAX.—For additions and alterations to house, Salterhebble, for Mr. William E. Sherman, of Manchester. Mr. Arthur G. Dalzell, architect, Albany-chambers, 15, Commercial-street, Halifax. Quantities by architect :—

Edwards & Ackroyd	£559 3 4	T. Sutcliffe	£383 10 11
J. Charnock & Son	504 6 4	F. Lomas & Sons	375 10 0
H. Greenwood	476 17 0	A. Steele & Son	370 9 6
Geo. Townsend & Son	433 0 0	Fielding & Bottomley	366 0 0
J. Whatmough	401 7 6	S. & W. Pickles	360 0 0
S. Earnshaw	399 16 11	B. & T. H. Riley, Halifax*	347 10 0
A. Darnes & Son	398 0 0		
C. Ramsden	395 0 0		

* Accepted.

HARROGATE.—For the new Montpelier Baths for the Harrogate Corporation. Messrs. Baggallay & Bristowe, architects, 66, Conduit-street, London, W. :—

Excavator, Bricklayer, & Mason.

Brown & Backhouse	£46,150 0 0	Moulson & Co.	£40,570 0 0
Thomas Linskill	46,040 0 0	J. Hodson & Son	40,430 0 0
Isaac Dickenson	45,933 0 0	F. Ives	39,496 7 0
Osborne & Co.	45,345 3 0	A. & W. Pattinson	39,368 0 0
Wm. Holdsworth	42,384 0 0	W. Ives & Co.	38,200 0 0
W. C. Atkinson	42,148 13 6	W. Radcliffe	37,985 10 0
J. Whincup	41,847 18 10	Isaac Gould*	36,500 0 0
James Taylor	40,811 10 0		

Carpenter and Joiner.

Thomas Linskill	£15,112 10 9	Brown & Backhouse	£11,335 10 0
Nicholson & Son	12,859 11 0	A. & W. Pattinson	11,272 0 0
G. Scales	12,580 0 0	Moulson & Co.	10,630 0 0
William Bellerby	12,294 0 0	W. Ives & Co.	10,302 0 0
Osborne & Co.	12,205 1 7	James Taylor	10,138 0 0
Wm. Brown & Son	11,980 0 0	Isaac Gould*	10,000 0 0
W. C. Atkinson	11,727 7 5	W. Radcliffe	9,731 17 0
W. Lissaman, Jun.	11,645 14 5	W. Mason & Son	9,478 0 0

Plumber and Glazier.

Osborne & Co	£8,003 17 4	J. H. Shonksmith	£6,950 0 0
T. G. Hodson	7,771 8 7	J. Snowden & Son	6,900 0 0
Thomas Linskill	7,400 0 0	A. & W. Pattinson	6,857 0 0
W. C. Atkinson	7,317 15 0	A. Wills	6,629 0 0
Slater & Son	7,244 3 0	A. Dougill	6,580 0 0
Woffenden	7,126 2 7	Henry Lindley	6,520 14 9
A. C. Wilbey	7,063 0 0	W. Radcliffe	6,384 7 0
Higginbotham	7,060 13 9	J. Thompson	6,360 0 0
J. Lindley	7,032 4 8	H. Braithwaite & Co.*	6,351 0 0
C. Foster	6,990 0 0	J. E. Bedford	6,170 17 8
Jos. Lawson	6,957 0 0	Lattle & Son	6,110 0 0
J. Naylor & Son	6,950 0 0		

Slater.

Osborne & Co.	£972 1 11	S. Johnson & Son	£797 3 6
Lamb Bros.	944 7 10	Thomas Linskill	787 3 0
A. & W. Pattinson	938 0 0	J. Leason	785 16 0
W. C. Atkinson	936 3 4	John Baynes	766 0 0
Jos. Bancroft & Son	847 6 5	J. Shepherd*	747 3 0
W. Radcliffe	799 6 9	Thornton Bros.	700 0 0

Smith and Ironfounder.

Clay & Co.	£10,958 18 5	J. W. Brooke	£9,289 12 7
Teesdale Bros.	10,898 12 4	Taylor & Parsons	8,911 18 10
J. & J. Horsfield	10,152 0 0	A. & W. Pattinson	8,565 0 0
Thomas Linskill	9,900 0 0	W. Radcliffe	8,563 8 0
Osborne & Co.	9,746 8 7	A. Dougill	8,431 8 10
E. Oldroyd	9,491 0 0	H. Braithwaite & Co.*	8,149 0 0

Plasterer.

Osborne & Co.	£3,982 17 0	W. Radcliffe	£2,499 0 0
F. Rawlins & Sons	3,526 12 0	W. C. Atkinson	2,427 10 0
Thomas Moore	2,995 0 0	Cooper & Mason	2,420 10 0
Thomas Linskill	2,773 10 0	Dobson	2,347 19 0
Jos. Bancroft & Son	2,712 5 0	Cordingley	2,300 0 0
A. Firth	2,656 15 0	J. Hodson & Son	2,002 0 0
J. P. Mountain	2,640 0 0	W. H. Hargreaves	1,938 0 0
Lamb Bros.	2,585 0 0	A. & S. Wheater	1,934 0 0
A. & W. Pattinson	2,549 0 0	S. Johnson & Son*	1,627 18 0

Painter.

Osborne & Co.	£2,270 14 7	W. C. Atkinson	£1,555 12 0
Thomas Linskill	2,109 12 9	W. Radcliffe	1,533 0 0
Marshall	2,060 0 0	Jos. Walker	1,525 5 0
Higginbottom	1,694 4 10	A. & W. Pattinson	1,475 0 0
Wood	1,609 5 0	G. Thompson	1,470 0 0
Topham Bros.	1,595 5 0	A. C. Wilbey	1,393 0 0
J. H. Stottard	1,573 0 0	J. T. Pollard*	1,326 0 0

* Accepted.

HARROGATE. — Accepted for masons', joiners', plumbers', plasterers', marble masons', and ironfounders' work for alterations to shops and business premises. Messrs. L. Leadley & Son, architects, 3, Coleridge-place, Bradford :—

T. Taylor & Son, Bradford £624 9 4

HARROW-ON-THE-HILL.—For the erection of a house for Mr. W. J. Overhead. Mr. W. H. Harrison, architect, 65, Victoria-street, S.W. :—

Batchelor	£1,398	Turner & Co.	£1,302
A. Webbe	1,392	F. T. Chinchen*	1,249

* Accepted subject to modification.

HASLINGDEN (Lancs.).—For the construction of sewerage works, laying out land, &c., for the Haslingden and Rawtenstall Outfall Sewerage Board. Mr. Leonard Hinnel, C.E., 15, Mawdsley-street, Bolton :—

Geo. Bell, Tottenham Hale, London (at per schedule of prices).

HEMEL HEMPSTEAD.—For the erection of police station. Mr. Urban A. Smith, County Surveyor :—

J. H. Mollett	£5,983	Edwd. Horn	£4,450
Dove & Co.	5,045	N. J. Linzell	4,436
Smith & Son	4,660	Honour & Son	4,008
Wm. Sear	4,580	Jas. Payne, Hemel Hempstead*	3,824
F. Dupont	4,471		

* Accepted.

HOVE.—Accepted for warehouse and stabling, for the Brighton and Hove Co-operative Supply Association, Limited. Messrs. Lainson & Son, Brighton, architects :—

J. Barnes, Brighton £9,121 0 0

LONDON.—For erection of a test wash-house at the workhouse, Northumberland-street, W., for the Guardians of St. Marylebone Parish. Mr. A. Saxon Snell, architect :—

		Extra for glazed wall tiling.
Thos. Nye	£370 10	£32 0
R. Yerbury & Sons	340 0	20 0
Matthews Bros.	330 10	30 0
Leslie & Co.	326 10	29 10
F. F. Chinchen	309 0	33 0
Thos. Bendon	280 0	42 0
H. Wall & Co.	274 0	21 0
J. H. Newman, Fenchurch-street*	235 0	12 0

* Accepted.

LONDON.—For alterations and additions to the workhouse, New End, Hampstead, N.W., for the Board of Guardians of the Poor of the Parish of St. John, Hampstead. Mr. C. R. Hancock, architect and surveyor :—

Thorpe	£2,700	Burford & Son	£2,190
Thompson	2,497	Anley	2,140
William Pearce	2,359	Ballard	2,131
Watts	2,270		

LONDON.—For the erection of new church of St. Andrew, Whitehall Park, Highgate. Mr. F. Hammond, architect, 1, Circus-place, London Wall :—

	A	B	C
Woodward & Co.	£8,490	£710	£205
B. E. Nightinghale	8,220	512	148
Dove Bros.	7,975	625	265
Patman & Fotheringham	7,921	944	181
Gould & Brand	7,306	827	190
Lawrance & Sons	7,245	892	230
L. H. & R. Roberts	7,236	650	140
Killby & Gayford	7,220	355	190
J. S. Scott	6,673*	974	183

* Accepted.

A. Red brick facings and Portland stone dressing.
B. Extra if Kentish Rag facings.
C. Deductions if Bath stone dressings.

LONDON.—For additions to St. Matthew's Mission Church, Yerbury-road, Upper Holloway, N. Mr. F. Hammond, architect, 1, Circus-place, London Wall :—

J. & H. Cocks	£1,035	Godson & Sons	£795
George Cox	977	Dove Bros. (accepted)	735

LONDON.—For alterations and additions to 104, 105, 106, Leadenhall-street. Messrs. Wm. Eve & Son, architects, 10, Union-court, Old Broad-street, E.C. :—

F. & H. F. Higgs	£1,894	Harris & Wardrop	£1,710
Lascelles	1,853	Johnson, 785, Commercial-road, E. (accepted)	1,497
Godfrey & Sons	1,754		

LONDON.—For factory, stabling, &c., Whitechapel, for Messrs. Kearley & Tonge. Messrs. Wm. Eve & Son, architects, 10, Union-court, Old Broad-street, E.C. :—

Braid & Co.	£7,200	Chessum & Son	£6,839
Godfrey & Son	6,987	Killby & Gayford	6,684
Shurmur	6,900	Harris & Wardrop, Wallwood-street, E.*	6,683
F. & H. F. Higgs	6,809		
Patman & Fotheringham	6,851		

* Accepted.

LONDON.—For extension of stabling at York Mews, City-road, for Messrs. Martin & Allen. Messrs. Wm. Eve & Son, architects, 10, Union Court, E.C. :—

Godfrey & Son	£926	Eaton & Co.	£863
Salt	919	J. H. Johnson, 785, Commercial road, E.*	799
Harris & Wardrop	898		
F. & H. F. Higgs	892		

* Accepted.

LONDON.—For erecting residence at Shepherd's Hill, for Mr. J. D. Nelson. Mr. Walter Graves, architect, Winchester House, E.C. Quantities by Mr. George Francis, 20, Finsbury Circus :—

Stimpson & Co.	£4,400	Houghton & Son	£4,097
Grover & Son	4,361	Kearly	4,055
Waddington & Co.	4,337	Burman & Sons	3,999
Killby & Gayford	4,226	Turtle & Appleton	3,975
Youngs & Son	4,190	Gould & Brand	3,964
Harris & Wardrop	4,130	Cottrell	3,937
Patman & Fotheringham	4,121	Maxwell Bros.	3,499

LONDON.—For the erection of a block of flats and shops, "North House," No. 5, 6, and 7, Sloane-street, Belgravia. Mr. Alfred J. Best, architect, 17, Sloane-street, S.W. Quantities by Messrs. D. Campbell & Son, 69, Finsbury-pavement, E.C. :—

		Extra for Brickwork in Cement.
S. J. Jerrard	£25,600	£300
Mowlem & Co.	25,000	183
Foster & Dicksee	24,374	185
Shillitoe	23,850	250
Lathey Bros.	23,527	230
Holliday & Greenwood	23,333	—
Boyce	22,840	153
Nightingale	22,815	—
Johnson & Co.	22,700	248
Perry & Co.	22,462	250
L. H. Holloway	22,377	250
Holloway Bros.	21,974	200

LONDON.—For alterations, &c., at 15, Newcastle-street, Farringdon-street, for Mr. T. H. Collyer :—

Morley	£212 0	Thos. Watson, Dulwich (accepted)	187 0
London	188 14		

LONDON.—Accepted for reinstating after fire, Cooperage, Upper East Smithfield, for Mr. P. Gilling. Mr. S. James, architect, Upper Park, Loughton :—

J. Howlett & Son £800 0 0

[No competition.]

LONDON.—For new nurses' rooms, &c., at the City of London Hospital for Diseases of the Chest, Victoria Park, E. Mr. R. Langton Cole, architect. Quantities by Messrs. H. H. Leonard and Clarke :—

A. Reed & Sons	£2,270	William Pearce	£1,905
Perry & Co.	2,210	Killby & Gayford	1,900
Woodward & Co.	2,140	Colls & Sons	1,872

LONDON.—For alterations and additions to Nos. 91 and 93, Ryelane, for Messrs. Davis Bros. Mr. John Jas. Downes, architect, 12, The Parade, Lewisham High-road, S.E. :—

R. Soper	£536 10	H. L. Holloway	£465 0
H. Lorden & Son	533 0	S. R. Best	427 10
W. Parker	470 0	W. Champion (accepted)	375 0

LONDON.—For alterations and repairs at 87, 89, and 91 Wilkes-street, Spitalfields, E. Mr. George Lamb, architect :—

Oldis	£240	Lister & Co.	£185
Watts	237	R. Eddie	180
F. & F. J. Woods	225	Coulsell Bros.	163

LONDON.—Accepted for new shop front and interior fittings, for Messrs. Evans & Davies, 37, Falcon-road, Clapham Junction :—
Martin D. Wills £160 0 0

LONDON.—Accepted for forming basement under shop, 351, Edgware-road, for Messrs. Chapman :—
F. T. Chinchen £365 0 0

MYNYDDISLWYN (Mon.).—Accepted for additions and alterations to Abercarn, Crumlin, and Ynysddu school buildings, for the School Board. Mr. George Rosser, architect, Albion Chambers, Newport. Quantities by the architect :—

Alterations, &c., Abercarn Schools.

Thomas Williams, Newbridge, near Newport, Mon. £120 0 0

Alterations, &c., Crumlin Schools.

W. F. Lewis, Merthyr, S. Wales 181 10 11

Alterations, &c., Ynysddu Schools.

Davies Bros., Abercarn, near Newport, Mon. 74 13 0

PLAISTOW (Essex).—For tar-paving playgrounds and yards, Grange-road Schools, for the West Ham School Board. Messrs. J. T. Newman & Jacques, architects, 2, Fen-court, London, E.C. :—

Lagdon & Crawford	£486 10 0	Ingham	£368 6 8
J. Smart	442 19 0	Asphalte Limestone Concrete Co.	344 8 2
W. Merrin	414 0 0	Hobman & Co.	325 0 0
Bensted & Son	412 0 0	Constable & Co., City*	319 0 0
Marchu & Co.	373 0 0		

* Accepted.

PLECK (Staffordshire).—For the erection of house, Pleck, near Walsall, for Mr. Joseph Corbett. Mr. H. E. Farmer, architect, Darlaston. Quantities by architect :—

H. Gough	£1,220 12 10	S. Teece	£1,035 0 0
F. Lindsay Jones	1,195 0 0	Hammond Bros., Darlaston*	1,020 0 0
Wm. Lees	1,120 0 0		
France & Tranter	1,090 0 0		

* Accepted.

SELBY.—For deepening an artesian well, at the waterworks, for the Local Board. Mr. W. Curry, Surveyor, Town Hall, Selby :—Vivians Boring and Exploration Company ..... £460 and £3 per foot below 500.

Chapman & Sons	288	and £1 18s., £2, £2 2s., £2 4s., £2 6s. per foot below 550.	
John Thom	230	and 35s., 36s., 37s., 38s. and 39s. below 550 ft.	
C. Rhodes & Sons	200	and £1 5s. per foot below 550 ft.	
E. Timmins & Sons, Runcorn	200	and £1 per ft. below 550 ft.*	

* Accepted.

WAINFLEET ALL SAINTS (Lincs.).—For the construction of cattle and sheep market, for the Market Company. Messrs. Jas. Martin & Sons, surveyors, Wainfleet, Lincs. :—

Thomas Elmes	£285 15 5		
J. T. Turner, Wainfleet (accepted)	284 6 0		

WAKEFIELD.—For the construction of main pipe sewer and surface water drain, Lincoln-street, Alverthorpe. Mr. Frank Massie, C.E., Tetley House, Wakefield :—

L. Booth	£188 9 2	T. & G. Wilson	£159 15 0
A. & W. N. Meston	184 16 4	W. Doleman	151 14 6
Garforth Bros.	172 0 0	H. Barraclough	148 3 5
M. Arundel	169 11 6		

WEST HAM.—For the construction of 1,000 ft. roads and sewers, Stratford, for the School Board. Messrs. J. T. Newman & Jacques, architects, 2, Fen-court, E.C. Quantities by Messrs. R. L. Curtis & Son :—

	Holbrook-road.	*Manor-road.*
G. Sharpe	£2,370 0 0	£2,475 0 0
Rutty	1,690 0 0	2,699 0 0
W. J. Maddison	1,825 0 0	2,455 0 0
Lagdon & Crawford	1,633 0 0	2,130 0 0
S. Kavanagh	1,991 0 0	2,913 0 0
Jesse Jackson, Leyton	1,494 0 0*	1,894 0 0
S. Griffith	2,500 0 0	3,760 0 0
Gregar & Son	2,187 0 0	2,439 0 0
J. Burrill	1,830 0 0	2,130 0 0
F. Adams, Wood Green	1,469 0 0	1,758 0 0*

* Accepted.

WOKING.—For additions, &c., to various schools for the School Board. Messrs. Welman & Street, architects, Guildford and Godalming :—

C. Fifield	£353 12	T. Millard, Woking*	£189 0

* Accepted.

WOLSTANTON (Staffs.).—For the erection of board school for 265 infants and 600 mixed scholars, for the Wolstanton School Board. Mr. A. R. Wood, architect, Tunstall :—
Chas. Cope, Tunstall (accepted) £6,584 0 0

WOLVERHAMPTON.—For the erection of house and business premises, Stafford-street, Wolverhampton, for Mr. Wm. D. Forsyth. Mr. H. E. Farmer, architect, Darlaston. Quantities by architect :—

F. Lindsay Jones	£1,300	H. Gough	£1,018
R. Jones	1,157	S. Teece	990
France & Tranter	1,085	Thomas Tildesley*	970
Hammond Bros.	1,030		

* Accepted.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office, 19s. per annum (or 4s. 9d. per quarter), can ensure receiving "The Builder," by *Friday Morning's Post.*

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c. 26s. per annum. Remittances (payable to DOUGLAS FOURDRINIER) should be addressed to the Publisher of "THE BUILDER," No. 46, Catherine-street, W.C.

TO CORRESPONDENTS.

G. W.—F. O. F. (we do not understand your communication).—"Cousin Jack" (it is hardly possible for any one to give an opinion except by inspecting the work itself. There might be two or three different causes of failure).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER," LONDON.

THE INDEX and TITLE-PAGE for Volume LXV. (July to Dec. 1893) were given as a supplement with January 13th.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE SIXTY-FIFTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, is now ready.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction &c., may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about thirty words) or under. .... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Postal Orders, payable to DOUGLAS FOURDRINIER, and addressed to the Publisher of "THE BUILDER," No. 46, Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" cannot be guaranteed for any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the front Page should be in by TWELVE noon on WEDNESDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before 10 a.m. on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C., free of charge.* Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

THE BATH STONE FIRMS, Ltd.
BATH,
FOR ALL THE PROVED KINDS OF
BATH STONE.
FLUATE, for Hardening and Preserving Calcareous Stones and Marbles.

DOULTING STONE.
CHARLES TRASK & SONS,
DOULTING, SHEPTON-MALLET.
London Agent:
E. A. WILLIAMS, 16, Craven-st., Strand, W.C.

W. H. Lascelles & Co.
121, BUNHILL ROW, LONDON, E.C.

Telephone No. 270.

HIGH-CLASS JOINERY.
LASCELLES' CONCRETE.
Architects' Designs are carried out with the greatest care.
CONSERVATORIES,
GREENHOUSES,
WOODEN BUILDINGS,
Bank, Office, & Shop Fittings.
CHURCH BENCHES & PULPITS.
ESTIMATES GIVEN ON APPLICATION.

"THE BUILDER" CATHEDRAL SERIES.

THE CATHEDRALS OF ENGLAND AND WALES.

(January, 1891, to June, 1893.)

In each case—EXTERIOR VIEW, specially drawn for this series, GROUND PLAN, to a large scale, shaded to indicate the date and style of the several parts; DESCRIPTIVE ARTICLE, with sketches of details, &c.

*1. Canterbury	9. Norwich	17. Llandaff	24. Truro
*2. Lichfield	10. Rochester	18. Oxford	25. St. David's
*3. St. Alban's	*11. Lincoln	19. Southwell	*26. York
*4. Peterboro'	12. Gloucester	20. Worcester	27. Ripon
*5. Wells	13. St. Paul's	21. Bangor and 93. Winchester	28. Chester
*6. Exeter	14. Hereford		29. Manchester
*7. Salisbury	15. Chichester	22. St. Asaph	30. Carlisle
8. Bristol	16. Ely		31. Durham

*Post-free FOURPENCE-HALFPENNY each, except 1, 2, 3, 4, 5, 6, 7, 11, and 26, the numbers of "THE BUILDER" containing these being *out of print*; but reprints of the VIEW, PLAN, AND DESCRIPTION OF CANTERBURY, LICHFIELD, ST. ALBAN'S, PETERBOROUGH, WELLS, EXETER, SALISBURY, LINCOLN, and YORK, can be had, price 1s. each. Postage and packing of reprints extra; single sets, 2d. or the nine sets together, 6d.

☞ [The whole series (including reprints) 26s.; post-free, 17s. 6d.]

THE ANCIENT CATHEDRALS OF SCOTLAND.

1893.

1. Glasgow	*July* 1	3. Aberdeen	*Sept.* 2	5. Iona	*Nov.* 4
2. Edinburgh	*Aug.* 5	4. Kirkwall	*Oct.* 7	6. Dunblane	*Dec.* 2

1894

7. Dunkeld	*Jan.* 6	8. St. Andrews 9. Brechin	*Feb.* 3	10. Elgin	*Mar.* 3

THE ANCIENT CATHEDRALS OF IRELAND.

1894.

1. St. Patrick's, Dublin	*April* 7.	2. Christchurch, Dublin	*May* 5
3. Kilkenny		*June* 2	

THE ABBEYS OF GREAT BRITAIN.

1. Westminster .. .. *Jan.* 6, 1894.

(This Series will be resumed when the Irish Series is completed.)

Post-free FOURPENCE-HALFPENNY each.

THE REREDOS, ST. PAUL'S

(15 in. by 11½ in.), on stout paper, for framing, 6d.; by post, 8d.

PORTFOLIOS.

for Preserving the Plates unfolded, 2s. 6d.; by post, 3s.

London: Publisher of "THE BUILDER," *46, Catherine-st., W.C.*

HAM HILL STONE,
The attention of Architects is specially invited to the durability and beautiful COLOUR of this material. Quarries well opened. Quick despatch guaranteed. Stonework delivered and fixed complete. Samples and estimates free Address, The Ham Hill Stone Co., Norton, Stoke-under-Ham, Somerset. London Agent: Mr. E. A Williams, 16, Craven-st., Strand, W.C. [ADVT

CRAIGLEITH STONE.
UNEQUALLED for Staircases, Steps, and Landings especially for Public Buildings with great wear.
VERY HARD, and NEVER WEARS SLIPPERY
SOLE AGENTS for England,
J. & A. CREW, Cumberland Market, London, N.W.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co. [ADVT.

SPRAGUE & CO.'S
INK-PHOTO PROCESS,
4 & 5, East Harding-street,
Fetter-Lane, E.C. [Advt.

QUANTITIES, &c., LITHOGRAPHED accurately and with despatch.
METCHIM & SON, 20, Parliament-st., S.W.
"QUANTITY SURVEYORS' TABLES AND DIARY,
For 1894, price 6d. post 7d. In leather 1/- Post 1/1. [ADVT.

SLATES. SLATING. TILING.
Roberts, Adlard, & Co.
47, EASTCHEAP, CITY.
SLATE SLAB WORKS.

EUREKA GREEN SLATES.
SOLE IMPORTER